

FINAL REPORT

Parent-child reading to improve language development and school readiness:

A systematic review and meta-analysis



James Law

Jenna Charlton

Cristina McKean

Fiona Beyer

Cristina Fernandez-Garcia

Atefeh Mashayekhi

Robert Rush

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EXECUTIVE SUMMARY

WHAT WE KNOW ALREADY

For a number of years now population studies have shown us that parental book reading is an important feature of what is sometimes called the child's Home Learning Environment (HLE). Evidence suggests that the more parents read to their children and the more books there are in the child's home, the better a child will perform in terms of their later academic and social performance. This then raises the question of whether it is possible to provide interventions that promote early reading and whether those effects last. There have been a number of reviews of the intervention literature, but these have included a mixture of different types of studies and ages of children and have a variety of different foci. In this report we carry out a narrowly constrained systematic review focusing specifically on book reading interventions carried out specifically by parents and carers with preschool children (up to the age of five years) and looking primarily at the impact of parent child reading interventions on expressive language (use of language to convey meaning to others) and receptive language (understanding the words and language of others) and pre-reading skills.

WHAT DID WE DO?

We searched all the literature available in electronic databases over the past forty years for parent-child reading intervention studies which included books or electronic readers. The studies had to have adopted a randomised or a quasi-experimental (matched) design with book reading being compared with no intervention. The intervention had to be carried out by the parent/carer – i.e. not by early years or school staff. Studies needed to report language outcomes (comprehension and/or expressive language) or pre-reading outcomes (for example, phonological awareness). To be included studies had to report the children's test performance before and after the intervention.

WHAT WE FOUND

We identified 22 studies which met our inclusion criteria and of these we were able to meta-analyse the results from 16 studies. Altogether, the reviews reported on 751 children receiving intervention, and 569 control group children, and were conducted across 5 countries. The mean age of the children was 39.47 months. There were a number of key

findings from the review. The first is that the majority of the studies show positive effects but the largest effect by quite a long way was on receptive language skills demonstrated by a number of randomised controlled trials, however this effect was non-significant. The average effect size of 0.68 for receptive vocabulary is equivalent to an advantage of 8 months using criteria developed by the Education Endowment Foundation. This was twice to that for pre-reading skills and for expressive language.

The findings for receptive vocabulary skills is especially important for two reasons. Receptive language skills tend to be more predictive of later educational and social difficulties in school and, to date, evidence has suggested that early receptive language skills were the most difficult to change. Other findings from the review indicated that early book reading was powerful throughout the preschool period particularly for receptive vocabulary development, but book reading was also effective for children over three years of age and slightly more effective with more socially disadvantaged children. There was some indication that studies which included electronic devices had similar effects to those that used books. Interestingly, in practice, shared reading which is unstructured and typical of reading likely to already exist in the home, was found to be more effective than dialogic methods, which are more structured, for receptive language development. Importantly and unlike most of the findings from the other reviews our findings were relatively consistent or homogeneous (the results going in the same direction). This is almost certainly a function of the narrow focus of the review and gives us confidence in predicting what is reasonably achievable in this area. The intervention effects appear to be marked at relatively low dosage. Whether the findings point to book reading providing an inoculation against downstream effect on language, school readiness or indeed school performance is another question not addressed by the data we have looked at here. Studies tend to report only on the immediate impact of the interventions.

We were also interested in whether such intervention studies have been carried out in a range of different countries and indeed this was the case. While the majority (15) were carried out in the US there were also two from South Africa, two from Canada, two from Israel and one from Hong Kong. The findings were comparable across countries. None of the included studies had been carried out in the UK. In the light of common practice in some areas it is significant that we identified no intervention studies which sought to assess the

effects of a universal model of book gifting, simply giving books to everyone. Similarly, we found no studies which allowed us to draw comparisons between the relative role of mothers, fathers, other carers and siblings.

In summary, this is a tightly constrained systematic review with clear findings. The results are coherent if slightly lower than some other reviews but give a clear indication of the level of response that should be predicted from this type of intervention.

WHAT WE SHOULD DO NEXT?

We make a series of recommendations for different target audiences

Recommendation 1: FOR CARERS

That knowledge about the role of parents as partners in active book reading be widely disseminated through all relevant early year's organisations.

Recommendation 2 : FOR PRACTITIONERS

That all early years/ public health practitioner are aware that parent/child book reading activities need to be a part of the early years "offer" to parents and young children.

Recommendation 3: FOR THOSE MANAGING SERVICES FOR YOUNG CHILDREN

That services are audited to establish where such interventions are being delivered.

Recommendation 4: FOR COMMISSIONERS OF SERVICES

That parent/child book reading should be an explicit element in the offer to young children and their families.

Recommendation 5: FOR THE COMMISSIONERS OF RESEARCH

That there is a need for trials to be carried out within the current UK context and the new initiatives from the Nuffield Foundation and the Education Endowment Foundation provide an excellent opportunity to undertake such an evaluation. These would also allow for these interventions to be evaluated in the diverse UK population; to date a gap in the evidence base.

Recommendation 6: FOR RESEARCHERS

That there be a better understanding of the differential effects of book reading on different populations and of the mechanisms by which book reading is associated with other aspects of the home learning Environment.

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Recommendation 7: FOR POLICY MAKERS

That parent/child book reading, and its equivalents be a part of the offer to all children and their families and that this be woven into local responses to the Government's Social Mobility Strategy

Chapter 1 - BACKGROUND

“School readiness” prior to the start of compulsory schooling has become a touchstone of educational policy in recent years and has come to be seen as a life chance indicator (Field 2010). Although the precise nature of school readiness continues to be discussed (Shonkoff and Phillips, 2000; Social Mobility and Child Poverty Commission, 2015), its core components invariably include early language development (Law, Charlton and Asmussen 2017; Law, Charlton, Dockrell et al. 2017) and pre-reading skills. Children’s academic success and early reading success is founded on emergent literacy knowledge and skills from birth to age 4 years (Sloat, Letourneau, Joschko et al 2015) which in turn is underpinned by oral language skills. Furthermore, there is clear evidence both that differences in experiences and cognitive skills have opened up by the time children reach school (Jerrim, 2013; Law, King, and Rush, 2014; Bradbury, Corak, Washbrook, and Waldfogel, 2015) and that such differences tend to be persistent. For example, Law et al. 2009 have shown that low vocabulary scores at five years are associated with poor literacy, mental health and low employment at thirty-two years of age (Law, Rush, Parsons et al. 2009) but many studies have demonstrated the connection between early literacy and later performance. For example, children who have poor reading skill at age 6-7 years have an 88% likelihood of remaining below expected levels for their age for the following 3 years (Juel, 1988; Melhuish et al., 2013). Similarly, those with poor literacy at 8-9 years are more likely to need long-term academic support, scoring below expectation in a number of curriculum areas and lagging behind their peers (Diamond, Justice, Siegler et al., 2013; Sylva, Melhuish, Sammons et al., 2008). Thus, tracking the sources of such differences with a view to addressing them has become of critical importance.

There have been a number of attempts to attribute differences to biological antecedents such as birthweight, hereditary differences etc. but the issue which has attracted the most consistent attention is the Home Learning Environment (HLE). The suggestion is that what parents and carers do with their children is at least as important as structural issues such as poverty or housing (Law, Rush, Roulstone et al (under review). For example, poverty is shown to be a risk factor for poor academic achievement, yet a language-rich environment may ‘defy the odds of socio-economic circumstance’ (Redding, 1997). It has been suggested that while an association is commonly identified the relationship may be more one of

association than cause (Puglisi, Hulme, Hamilton and Snowling 2017). One of the key components of the HLE is the ownership of books and the practice of reading to the child (Dickinson, Griffith, Golinkoff and Hirsh-Pasek 2012; McKean, Mensah, Eadie et al. 2015). A recent analysis of the predictors of language ability at 11 years has shown not only that early reading at a population level is predictive of subsequent language but this relationship is especially important for children performing in the bottom quintile (Law, Rush, King, et al. 2017). Indeed, there is a suggestion that this type of engagement may be more important than how much parents speak with their children (Hirsh-Pasek, Adamson, Bakeman et al. 2015). Other authors have emphasised the role that parent-child reading plays in developing the cultural capital that underlies subsequent school success (De Graaf, De Graaf and Kraaykamp, 2000). Although the predicted model often implies that simply increasing parental input is the key it is also important to acknowledge the role played by the child and specifically their cognitive abilities (van Bergen, Bishop, van Zuijlen and de Jong 2015). This, of course raises the question that, if we know that book reading predicts later performance and we know that interventions have the potential to enhance school readiness (Ramey and Ramey 2004), what is the evidence that parent-child reading interventions can have a specific effect on children's language and pre-reading skills and thus improve their prospects?

What are parent-child book reading interventions?

Parent-child reading interventions exist in different forms. They range from increasing access to books (for example, 'book gifting' in which the parent is given a book with or without instruction) through increasing parent-child book reading frequency without consideration of interaction style, to the fostering of specific book-sharing styles and techniques such as "shared book reading" (Close, 2001). In the most structured examples, known as interactive or "dialogic" reading the parent or carer is trained in a specific type of responsiveness to the child and/or use of questioning. Although some of these programs have a commercial identity, in most cases they are not owned or distributed by a specific developer. All of these interventions overlay what parents already do with their children. Alternative reading media (television, tablets etc.) are equivalent to book reading for many, although their developmental influence may differ, with some evidence suggesting that students engage in different learning strategies that might short-circuit comprehension

when engaging with digital devices compared to print (Wastlund, Norlander and Archer, 2008; Mangen, Walgermo and Kolbjorn, 2013). The intensity, length and duration of the intervention varies considerably. For example, duration of interventions may be anything from an hour per week, to several sessions a week, for a duration of a few weeks (for example 4 weeks) to a whole term (12 weeks) or even a whole year.

These interventions are commonly seen within a public health context. Some are targeted indicated – ie focusing on a referred population or populations that are identified because they have a specific identified need. For example, children identified with lower developmental skills, those with language delays or sensory difficulties. Others are targeted selective – ie focusing on a socio-demographic subgroup such as children living in poverty or because they are a part of an “at risk” group, for example, recent immigrant populations. Head Start or Sure Start are clear examples of populations identified as being at risk of later difficulties.

In observational studies of population cohorts parents are commonly asked about their own book reading activities with the child. But what is actually asked can vary considerably from how many books there are in the home, the number of times the parent reads to the child in a given week, whether the reading is done by the father, the mother or an extended family or another adult, and whether the child was regularly taken to the library. In other cases, enjoyment of reading rather than language development is the outcome.

One question related to book reading interventions concerns their acceptability to parents or perhaps more accurately whether they are equally acceptable to all parents. In a recent analysis of data from the Longitudinal Study of Australian children, Taylor and colleagues concluded “parent–child book reading interventions alone are unlikely to meet the needs of children and families for whom the absence of book reading is an outcome of psychosocial risk factors (p295).” In other words those likely to need such interventions most may be the least likely to be able to benefit from them. In short, to make a judgement about parent-child book reading interventions it is clearly important to ascertain who is doing what and for how long.

What have previous book reading reviews found?

We identified nine systematic and narrative reviews on the topic of early reading and the impact it has on different aspects of child development and adult performance. Bus et al

(1995) carried out a quantitative meta-analysis of the available empirical evidence related to parent-pre-schooler reading and several reading and language outcome measures. The review reports an overall effect size of 0.59 suggesting that book reading explains about 8% of the variance in reading and language outcome measures in Grade 1. Although relatively dated, this review is widely cited as the authority on the subject and is cited in many key policy documents. From a methodological point of view this review does not adhere to current review standards (Campbell Collaboration, 2018). For example, the effects of both the intervention and the observational data are added together in the meta-analysis and the numbers within the interventions are aggregated rather than allowing variation between included studies as a random effect. Likewise, it does not present forest plots presenting data in a succinct and replicable format, making it difficult to assess heterogeneity. The review also makes no clear analysis of population subgroups and there is speculation but no analysis of factors such as the age of the study. In terms of its content the effect estimates are relatively large by the standards of educational studies especially for the oral language outcomes and these may well have been inflated by the review methodology. The review is often cited as demonstrating evidence that interventions are more effective for children from low socio-economic backgrounds yet the process by which this conclusion is reached is poorly specified and measurement issues are not considered. Finally, Bus et al and most other investigators overlook the role played by the father and other adults in the child's immediate environment, a factor which is becoming especially important in contemporary families where employment and childcare arrangements may vary considerably.

A second review by Mol, Bus, deJong et al (2008) examined the association between parent-child book reading and vocabulary. Dialogic reading benefited children's vocabulary with a moderate effect (0.59) on expressive vocabulary and a small effect (0.22) on receptive vocabulary. Interestingly, this moderate effect size on vocabulary of 0.59 is identical to that reported in the original Bus et al (1995) study. Pre-schoolers in the UK (age 3-5 years) benefited significantly more than Kindergarten children in the US (age 5-6 years), and children not at risk for language and literacy impairments benefited more than those at risk.

Over a decade later than the original Bus review, the National Early Literacy Panel (2008) carried out a similar review which appeared to confirm Mol et al.'s findings; moderate effects of storybook reading interventions were found on children's oral language and print

knowledge, with smaller effect sizes reported for children at risk of reading difficulties. A further study by Mol, Bus and deJong (2009) carried out a meta-analysis to explore to what extent interactive storybook reading between educators and child, stimulates the two pillars of learning to read: vocabulary and print knowledge. Out of 31 studies included, 11 reported at least one outcome with a negative effect, but in general the majority of studies reported positive effects. Overall, a moderate effect size (0.54) was found for oral language skills, and 7% of the variance in kindergarten children's (age 5-6 years) alphabetic knowledge could be attributed to the intervention; despite the teaching of print-related skills not being part of interactive book reading. In 2011, Mol and Bus examined whether the association between print exposure (e.g., parent-child book reading, exposure to comic books or magazines) and components of reading grew stronger across development. In a meta-analysis of 99 studies focusing on the leisure time reading of three age groups (pre-schoolers (age 3-5) years and kindergartners (age 5-6 years), children attending Grades 1-12 (age 7-18 years), college and university students (18-21 years), with no restrictions on study design, moderate to strong correlations between print exposure, reading comprehension and technical reading and spelling were found. Authors report an 'upward spiral of causality'; children most proficient in comprehension and technical reading and spelling skills read more, and because of more print exposure, these skills improved more with each year of education. As an example, authors report that in preschool and kindergarten years, print exposure explained 12% of the variance in oral language skills, in the primary school years it explained 13%, in middle school 19%, in high school 30%, and in college and university 34%. Effect sizes between print exposure and language and basic reading outcomes in preschool and Kindergarten children ranged between 0.15-0.36, a small effect. For children in Grades 1-12, effect sizes ranged from 0.15-0.45, representing small to moderate effect. For undergraduate and graduate students, effect sizes ranged from 0.06-0.67, representing small, medium, and large effect. Outcomes suggested that frequent readers are more successful academically, and that poor readers can also benefit from independent leisure time reading.

However, the first two Mol, Bus and deJong reviews (1998;2009) are narrow in scope with respect to the type of intervention provided (dialogic-approaches, interactive storybook reading), as well as the inclusion of only a single outcome measure in the 2008 review, and a focus on vocabulary and print knowledge only in the 2009 review. None of these existing

reviews provides adequate guidance for appropriate targeting of early parent-child reading interventions at scale across the full population, which is essential for determining policy implications. Thus, it is not possible based on these reviews to conclude which children benefit the most from such interventions; whether the gap in attainment associated with social disadvantage is narrowed or widened; how large an effect might be gained and by which types of intervention; who is reading to children in which families and to what extent. Although, the 2011 meta-analysis does indicate the importance of reading during the preschool years, initiating an increasing pathway of competence in oral language skill throughout childhood and into adolescence.

In a systematic review of 67 studies including specific interventions aimed at improving children's vocabulary skills through instruction (Marulis and Neuman, 2010), storybook reading and dialogic reading were found to be the most common interventions ($n=34$, $n=8$ respectively). An overall effect size of intervention on vocabulary skill was reported as 0.88, an average gain of 1 standard deviation on vocabulary measures. However, although interventions delivered by parents were found to have a substantial effect size (1.11), interventions delivered by an experimenter or teacher, were found to have greater effect sizes (1.22, 1.15 respectively). In addition, the majority of studies were conducted by the experimenter or teachers (with the experimenter or teacher delivering the intervention), with only 11 including parents in intervention delivery. Middle- and upper-income at-risk children were significantly more likely to benefit from vocabulary intervention than those students also at risk and poor, which is a contrasting finding to the original Bus et al (1995) study. However, the review included interventions in which storybook reading was part of a more comprehensive program. These additional elements in more comprehensive programmes might have accounted for the larger effect sizes. The heterogeneity of the interventions mean that no firm conclusions could be made.

The Nuffield Foundation commissioned a report in 2013 exploring the evidence base for parental involvement interventions increasing attainment (Gorard and Huat See, 2013). Key findings included that there was no good-quality evidence that parental involvement interventions result in improved educational outcomes, in most age groups and for most approaches. Their report also highlighted a need for a large-scale robust study to determine whether the act of enhancing parental involvement through intervention leads to improved

educational outcomes. However, the report does state that the most promising phase for parental intervention is pre-school and preparation for primary school. However, this finding was based on an intervention that mixed parental involvement with an array of other intervention elements; therefore, it cannot be concluded that the parent involvement alone was effective or responsible for positive outcomes. Importantly, the report stresses that simply encouraging parents to work with their children, without training them or providing direct support is ineffective (at least for attainment). The report found 13 studies that focused on parental involvement in intervention in the preschool years and reported positive results, however 10 of these were deemed low quality. The 3 medium-sized quality studies reported on the same intervention; the Chicago Child-Parent Centre Programme (CPC). CPC included parental training with a child-centred focus on developing reading and language skills. However, it also included a number of other intervention elements, including teacher-directed whole class instruction, small group activities, field trips and play amongst other aspects. The complexity of the intervention therefore, means that it is difficult to tease apart what exact effect parental involvement in reading had on children, if any effect at all. There is still a need to understand what parent-implemented only interventions using reading has on children's language and school-related outcomes.

Sloat, Letourneau, Joschko et al (2015) carried out a systematic review evaluating evidence on the effectiveness of parent-mediated interventions that increase the time parents spend reading with young children up to 4 years old. Only four studies met inclusion criteria, reporting outcomes for 664 children, and a meta-analysis was conducted on three studies to examine the effects on reading duration. Standardised mean difference in reading duration was 1.61, in favour of the intervention group over control, furthermore, three studies reported improvement in children's receptive vocabulary in the parent-mediated intervention group (Golova, Alario, Vivier et al., 1999; High, Hopmann, LaGasse et al., 1998, 2000). The authors concluded that interventions aimed at increasing the amount of time parents spend reading interactively with their children yielded positive results, not only in that it was possible to increase parents' reading duration, but increased duration has positive impacts on children's language. However, it is important to note that the effect size of 1.61 is particularly high, and this may be due to one study (Cronan, 1996) having notably greater mean difference score (3.20) than the other two studies in the analysis Golova et al

(1999) and High et al (1998) (1.60,1.40 respectively). Results of this systematic review must also be regarded with caution, as outcomes are based only on 3 studies, each with similar study designs (two were randomised controlled trials (RCTs), and one quasi-experimental, both defined in the methods), conducted in urban community based pediatric health centres serving low-income multi-ethnic populations. Therefore, there is a question here over generalisability, and the impact of home-based parental reading interventions. As with the Bus et al (1995) review, the review makes no clear analysis of population subgroups, nor does it present forest plots. In addition, this review differs in focus from the current review as it looks at studies which primarily aim to increase the time parents read to their children, rather than the impact that specific reading interventions delivered by parents.

In 2015 The Early Intervention Foundation (EIF) commissioned a report on UK-based early interventions for children from conception to the start of primary school. Universal interventions included in the report targeting language, communication and school readiness include a home-based programme called Parents as Teachers, which focuses on creating a home environment that is conducive to preschool children's learning (Asmussen, Feinstein, Martin et al., 2016). The report also highlights individually delivered interventions, Let's Read, and Bookstart. Let's Read involves trained nurses distributing book packs during regular 'well-child' checks in the home, with the aim of increasing parent-child shared reading and, in turn, children's expressive vocabulary and communication. Bookstart involves families receiving books from Health Visitors for their infants first year, then further books when the child is 3-4 years. In addition to Bookstart, Bookstart Plus for two-year old children and their parents is also delivered at the universal level. Parents are encouraged to share books, stories and rhymes with their child through discussion and demonstration. Evidence for Let's Read and Bookstart is mixed. The majority of studies on Bookstart do not measure child outcomes, and instead focus on parent attitudes and awareness and changes to the home learning environment (e.g., frequency of book reading, number of books in the home). There is only one study of Bookstart that reports the statistical significance of difference between intervention and comparison groups in children's outcomes (Wade and Moore, 1998, 2000). Bookstart children were shown to significantly outperform the control group on English, Maths and Science at 5 and 7 years of age, and also on a range of SATS test elements, including reading comprehension, writing, spelling and maths.

Most recently, Wasik, Hindman and Snell (2016) conducted a systematic review of studies on book reading practices in early childhood that have resulted in increases in child vocabulary. Although the study does not include a meta-analysis, the characteristics of studies included provide insight into the most common forms of book reading delivery in intervention research. Of 36 included studies, 13 were conducted in classrooms with the teachers implementing the book reading with children, 16 were conducted by researchers in schools and surprisingly only 2 were conducted in home settings with parents implementing the book reading. Five of the studies used combinations of parents, teachers and/or researchers. Although each study reported increases in child vocabulary, authors conclude the effects of book reading as modest; the majority of studies reported children learning between only 1-4 words. In addition, studies varied extensively on a variety of dimensions, including strategies used, the dosage of reading provided to children, and the duration of the intervention, therefore outcomes are unable to provide guidance for practice. Important to note, this review focused narrowly on book reading and improvement in vocabulary development alone, and not language as a whole, reading comprehension or other outcomes associated with school-readiness.

Table 1. Comparison of systematic reviews of reading intervention

Study	Design	Pre-school	Delivery	Primary Outcomes	Subgroup Analysis	Effect Size – Overall or Individual	
Bus 1995 <i>Netherlands</i>	Experimental and observational	✓	Parent	Language; Emergent literacy; Reading achievement	SES Publication Status	Overall Individual	0.59 Lang 0.67 Literacy 0.58 Reading 0.55
Mol (1998) <i>Netherlands</i>	(Quasi-) experimental (incl. RCT)	✓ (plus K-garten)	Parent	Vocabulary	At risk for language impairment	Individual	Express. Vocab. 0.59
Mol (2009) <i>Netherlands</i>	(Quasi-) experimental (incl. RCT)	✓ (plus K-garten and First Grade)	Educators	Vocabulary; Print Knowledge	Publication bias Fidelity Intervention characteristics	Overall Individual	0.59 -0.10 to 2.04
Marulis (2010) <i>USA</i>	(Quasi-) experimental (incl. RCT)	✓ (through to 9 years)	Parent Teacher Experimenter	Word Learning	Int. characteristics SES; At risk status Measurement; Study design	Overall Individual	Vocab 0.88 -0.10 to 5.43
Mol (2011) <i>Netherlands</i>	No restrictions	✓ through to Uni)	Participant survey	Print exposure; Reading comprehension	Age; Publication status Ability level	Individual	Basic reading 0.15 to 0.36
Gorard (2013) <i>UK</i>	Review	✓ through to 2ndary)	Parent	Attainment	Age	None	None
Sloat (2015) <i>Canada</i>	(Quasi-) experimental (incl. RCT)	✓	Parent	Time spent reading with child	None	Overall Individual	1.61 1.40 to 3.20
Asmussen (2015) <i>UK</i>	Review	✓	Parent; Teacher; Clinician; Practitioner	Attachment; parental sensitivity; Social and emotional development; Language and communication	N/A	None reported	None
Wasik 2016* <i>USA</i>	(Quasi-) experimental (incl. RCT)	✓ (plus K-garten)	Parent Teachers Experimenter	Vocabulary	Int. strategies; Measures; Dosage; Quality Context; No. of words	None	None

The table above displays the characteristics of the study designs. Of the nine reviews, five explicitly state the inclusion of randomised controlled trials, 1 (Bus 1995) refers to studies as being 'experimental', yet it is unclear how many of these included a randomised design. In addition, this review also included observational studies. One review (Mol 2011) had no restrictions on study designs but data was taken from studies which included checklists or self-report.

Of the nine reviews, five of them focus on the impact of intervention beyond the preschool years as well as the preschool period. Although age groups are included in subgroup analysis in Mol (2011), other studies are limited by combining outcomes across a wider age range, as the number of confounding variables increase once children are in school. Given that the pre-school period is an optimal time for development, it is important that this period is carefully considered in any future reviews. Clearly, parents are best-placed to deliver interventions to children in the preschool years. Of the current reviews, only three focused on primarily parent-delivered intervention, with others including interventions delivered by educators and experimenters also.

Only Wasik (2016) considers differential dosage of interventions, however this is in narrative form only, rather than a meta-analysis of the effects of dosage on outcomes. Social Economic Status (SES) is accounted for in 2 studies in the Wasik review, therefore there is a gap in evidence for the consideration of the impact of SES on study outcomes. Furthermore, there are conflicting outcomes in these 2 studies with regards to the impact of SES, with Bus (1995) reporting children from low-SES benefit more from intervention than higher-SES children, and Marulis (2010) reporting that middle and upper SES at-risk children were significantly more likely to benefit from vocabulary intervention than children also at risk and poor. Therefore, this leaves us with a need to clarify the impact of SES and, to question what characteristics of intervention provide for the most optimum outcomes?

Effect sizes across existing reviews vary from -0.10 to 5.43¹, with this range even being observed in one review (Marulis, 2010). Therefore, we may question why there is such

¹ How big an effect size is depends on the activity and most importantly the way it is measured. The way these are interpreted are discussed in great detail in the Methods section below (pp19-20). In most cases effect sizes are reported in the range -1 through to +1 with -1 representing negative effects and + 1 representing positive

variability? The methodological rigour of the reviews themselves was variable. It is likely that the variability in study designs included within reviews, with some more robust than others, some including many or few participants, or many or few studies, will account for some of the variability in effect sizes. In addition to this, there is a tendency for the reviews to report an overall effect size, combining all studies regardless of measures, alongside individual effect sizes of studies. This overall effect size, often reported in abstracts, is problematic, and may lead to over-interpretation of results.

Summary

Book reading is a key element of the Home Learning Environment and both have been shown to be associated with later performance and wellbeing. A number of reviews (both systematic and narrative) have already been published. These reviews vary in methodology, level of specificity and focus; all of which may affect interpretation. There is a need to update the Bus et al. (1995) overarching review, taking into consideration recent developments in the field, systematically synthesising studies and examining the role played by potential mediators and moderators of the process of parent-child reading. It is important to bring these data together in an accessible manner to establish how much potential parent-child reading has for reducing inequalities in school readiness and oral language skills.

effects. An effect size of 5.43 is exceptionally high and is likely to reflect a level of bias in the study in terms of the measures used, whether the study is blinded etc.

Questions addressed in this review

The current review aims to address the following research questions.

- What is the evidence of effectiveness of joint book reading with preschool children and parents in improving school readiness, oral language, and parent child interactions?
- How does effectiveness vary between characteristics of children, for different adult relationships to the child and with different reading intervention activities?
- Is it feasible to capture the key review findings in an accessible “user friendly” format?
- To what extent does this evidence translate into sustained improvements in language and literacy outcomes for children?
- What should be recommended to early years’ practitioners, commissioners and policy makers about the messages associated with early parent-child reading?

Chapter 2 - METHODS

What types of study did we include?

The review included experimental and quasi-experimental designs. Studies had to report on the comparison between children receiving a parent-child reading intervention as defined above, and children not receiving intervention for reading or receiving 'treatment as usual', i.e. typical parent-child reading that may already occur as part of typical parent-child interactions during preschool years. RCT or quasi-experimental studies had to meet at least one of the following criteria:

1. In RCTs individual participants or groups of participants had been randomly assigned to intervention and control conditions.
2. In quasi-experimental studies participants in the intervention and control conditions were matched. One of the matching variables had to be reported at pre-test and had to be at least one of the outcome measures.
3. In studies where subjects were not allocated randomly there had to be evidence for initial equivalence of groups.

The following types of studies were excluded:

1. Cohort studies.
2. Before and after studies.
3. Experimental single subject designs.
4. Narrative/descriptive studies
5. Quasi-experimental studies that report only post-intervention data, therefore equivalence of groups pre-intervention cannot be determined.

Studies could be carried out in any country and published in any language.

Who were the study participants?

Studies included parents of children aged 1-5 years old. Children could not be aged any younger than 1-year old, or any older than 5 years old. 'Parents' were defined as primary

caregivers of the child, therefore including biological parents, grandparents, adoptive parents, foster parents, step parents or any other individual(s) recognised as a primary caregiver to a child. Eligible children were under the primary care and supervision of their parents or primary caregiver. In studies where a proportion of included children were outside the 1-5-year age range, they were included if >50% of children fell within the included age range. All children of 1-5 years were considered eligible, there were no restrictions due to ability/disability, developmental delay, or disorders.

There were no restrictions of parents or children based on socio-demographic factors including age, race, ethnicity, country, language, or socioeconomic status (SES), income and education status.

What types of interventions did we include?

1. We included any intervention involving direct parent-child reading to improve oral language and/or school readiness in preschool children (aged 1-5 years), meeting the following criteria: Intervention involved direct interaction between parent and child aged between 1 and 5 years old. This means that parents had to be actively engaging in shared-reading experiences with children, that is to say that the child was guided and supported in reading by their parent or primary caregiver, and they were the ones 'delivering' the intervention to the child.
2. Intervention included all types of reading interventions in the form of a practice (e.g. parent training, or a change in frequency of reading) or programme (e.g. that which includes a manualised set of instructions), which were explicitly different from typical parent-child reading occurring as part of typical parent-child interactions.
3. The reading stimulus was in the form of a book, magazine, tablet including iPad, or computer program.

Interventions were excluded under the following criteria:

1. Interventions that were primarily delivered by a professional practitioner or specialist (including speech and language therapist, teacher, teaching assistant or psychologist) were not included.

2. Interventions that were primarily delivered within a school setting by school staff were not included.

What types of outcomes did we include?

Primary outcomes

Oral language outcomes included:

1. Vocabulary (expressive, receptive)
2. Expressive language (narrative, grammar)
3. Receptive language (comprehension)

School readiness outcomes included:

1. Behavioural, social and emotional development (e.g. attention, self-regulation, following directions, social relationships and social cognition)
2. Motor development (e.g. coordination)
3. Physical wellbeing
4. Early literacy (e.g. letter naming, print awareness, phonological awareness)
5. Early numeracy (e.g. number naming, counting)
6. General Knowledge (e.g. shapes, colours, nouns)

Secondary outcomes

1. Parent-child interactions

Studies included in the review had to report on one or more of the primary outcomes.

Data time points

We included studies where measurement of primary outcome was taken at baseline (Time 1, pre-intervention) and 'Time 2' post-intervention. We included studies where only post-intervention measures were reported providing that there was indication that groups were comparable at baseline.

Types of settings

Intervention was primarily carried out in the home environment, child development centre (an assessment centre which provides outpatient assessment and continuing treatment), or could be online/computer-based, but there were no restrictions as long as the reading was shared between the child and a primary caregiver. Studies were included where parent training was received in a child development centre/clinic and reading took place at home.

How did we search for the studies that we identified?

We searched the sources listed below for all available years. We did not limit our search by language, date of publication or publication status; we would have translated non-English studies but in the end this was unnecessary. The search strategy which we employed was different for each database. An example of one of them can be found in Appendix B. The remainder are available from the authors of this report on request.

- ERIC (EBSCO, 1966 – 16th December 2016; British Education Index (EBSCO, [start date unclear] – 16th December 2016);
- Education Abstracts (EBSCO, 1983 – 16th December 2016); Linguistics and Language Behavior Abstracts (ProQuest, 1973 – 19th December 2016);
- Cochrane Central Register of Controlled Trials (CENTRAL, issue 11 of 12 42016), includes the Specialised Register of the Cochrane Developmental, Psychosocial and Learning Problems Group;
- International Bibliography of the Social Sciences (ProQuest, 1951 – 19th December 2016);
- Science Citation Index (Web of Knowledge, 1970 – 19th December 2016);
- Social Science Citation Index (Web of Knowledge, 1970 – 19th December 2016); Conference Proceedings Citation Index – Science (Web of Knowledge, 1990 - 19th December 2016);
- Conference Proceedings Citation Index – Social Science (Web of Knowledge, 1990 - 19th December 2016);

- Emerging Sources Citation Index (Web of Knowledge, 2015 - 19th December 2016);
- SpeechBITE (<http://speechbite.com/>).
- World Health Organization International Clinical Trials Registry Platform (WHO ICTRP; who.int/trialsearch).

Searching other resources

We checked the reference lists of included studies and relevant reviews identified by the electronic searches for further studies. We also contacted key authors in the field for information about ongoing or unpublished studies that we may have missed. In addition, we searched The Communication Trust's What Works database of interventions (thecommunicationtrust.org.uk/whatworks).

How were studies collected?

We downloaded the search results to Endnote. Following de-duplication, review authors (JC, FB, CF) independently selected potentially relevant studies for inclusion from the titles and abstracts. Review authors were not blind to the name(s) of the trial author(s), institution(s) or publication source at any level of review. Full-text copies of all selected studies were obtained. Disagreements about eligibility were discussed at each stage between reviewers and with the primary investigator (PI) if necessary. When information for deciding eligibility of studies was missing, we contacted trial investigators, where possible. Studies that were identified by mutual consent were included in the review.

Studies for which multiple reports appeared were categorised as 'included' or 'excluded' only once, and associated publications were listed as secondary references. All work was documented in accordance within PRISMA guidance ([Moher 2009](#)), and a flowchart of the process was produced (See Appendix A)

How were studies analysed?

Two reviewers independently extracted data onto a data extraction sheet in Excel designed specifically for the review. The data extraction sheet captured the following:

- Participant characteristics (age, gender, ethnicity, nationality, disabilities),

- Intervention style (dialogic, book gifting, shared reading etc), delivery (individual, group, video) and other features (e.g. number of books gifted, type of parent training)
- Intensity and duration of intervention (number of weeks, days per week, hours)
- Type of outcome measure (teacher observation checklist, standardised tests, criterion referenced measures)
- Follow-up time points
- Primary and Secondary outcome data (this was variously reported using mean scores, change scores, standard deviations, effect sizes and statistical significance values)

A third reviewer checked the extraction for accuracy.

Assessment of risk of bias in included studies

Risk of bias within each included study was assessed independently by two review authors using the Cochrane Risk of Bias tool (Chapter 8; <http://training.cochrane.org/handbook>). Bias was reviewed in six domains, namely sequence generation, allocation concealment, blinding, incomplete outcome data selective reporting bias and performance bias. All disagreements were resolved by consensus.

Measures of treatment effect

Treatment effect was measured using endpoint scores (or immediate 'post-intervention', 'Time 2' or 'T2' scores) or change scores. Treatment effects were calculated as Standardised Mean Difference (SMD) effect sizes; the degree of difference between the scores of the treatment and control groups. SMD scores were calculated to account for several versions of assessment tools (older and more recent as well as publications in different languages) measuring the same outcome across different populations.

Following convention Cohen (1969, p23) describes an effect size of 0.2 as 'small'. An example of a small effect size would be the difference between the heights of 15-year-old and 16-year-old girls in the US (this difference corresponds to an effect size of 0.2). An effect size of 0.5 is described as 'medium' and is 'large enough to be visible to the naked eye'. A 0.5

effect size corresponds to the difference between the heights of 14-year-old and 18-year-old girls.

Cohen describes an effect size of 0.8 as 'grossly perceptible and therefore large' and equates it to the difference between the heights of 13-year-old and 18-year-old girls. As a further example he states that the difference in IQ between holders of the Ph.D. degree and 'typical college freshmen' is comparable to an effect size of 0.8. Care has to be taken not to over interpret such rules of thumb. How important a result is, is not simply a matter of calibration. Glass *et al.* (1981, p104) are particularly critical of this approach, arguing that the effectiveness of a particular intervention can only be interpreted in relation to other interventions that seek to produce the same effect. They also point out that the practical importance of an effect depends entirely on its relative costs and benefits. In education, if it could be shown that making a small and inexpensive change would raise academic achievement by an effect size of even as little as 0.1, then this could be a very significant improvement, particularly if the improvement applied uniformly to all students, and even more so if the effect were cumulative over time (i.e. in education).

The Education Endowment Foundation have taken this one step further by suggesting that effect sizes may be "standardised" further to correspond to the number of month gain in attainment of the intervention group relative the control (see Table 2) (Coe et al.2013). This is very helpful and certainly encourages the use of short hand in the interpretation of the results. Leaving aside the risk of overreliance on single figures as a means of interpretation of the effectiveness of an intervention, we also have an additional developmental phenomenon not picked up by Coe and colleagues that six months progress also needs to be considered in the light of the chronological or even the developmental age of the child. So, a six-month gain at two years of age would mean something very different from a six-months gain at twelve years of age simply by virtue the proportion that six months represents of the age in question (i.e. 25% of the child's life at 24 but only 4.2% of a child's life at 12 years. It is important to note that the EEF criteria for what constitutes different levels of effect varies somewhat from those of Cohen described above. The key difference is that for Coe and colleagues, high starts at 0.45 rather than 0.8 but it is important to stress that these are only rules of thumb. For this review will we be guided by the EEFs interpretation of effect size.

Table 2 – The Education Endowment Foundation’s developmental equivalents of effect sizes.

Months' progress	Effect Size from to	Description
0	-0.01	0.01	Very low or no effect
1	0.02	0.09	Low
2	0.10	0.18	Low
3	0.19	0.26	Moderate
4	0.27	0.35	Moderate
5	0.36	0.44	Moderate
6	0.45	0.52	High
7	0.53	0.61	High
8	0.62	0.69	High
9	0.70	0.78	Very high
10	0.79	0.87	Very high
11	0.88	0.95	Very high
12	0.96	>1.0	Very high

How were the data synthesised?

We described the range of interventions, populations and outcomes reported in the included studies. We planned to conduct three main analyses: Expressive language and vocabulary, receptive language and vocabulary and pre-reading outcomes.

Data on effectiveness was tabulated and described, including variation in the form, setting, study population and delivery of the interventions. Studies using comparable interventions and reporting the same outcomes were pooled using standard pair-wise meta-analysis, using a random effects model in Stata (StataCorp 2013). These allowed us to produce the associated forest plots which are the key summary outcome in this report.

We pooled the results of each assessment when more than one study reported them. For expressive outcomes, these included Expressive One Word Picture Vocabulary Test (EOWPVT), Expressive Vocabulary Test (EVT), Illinois test of psycholinguistic abilities (ITPA), and the number of different words used by children. For example, if more than one study reported using the EOWPVT, the EOWPVT scores for these studies were pooled together and a meta-analysis conducted on these. For receptive outcomes, only the Peabody Picture Vocabulary Test (PPVT) scores were pooled as this was the most frequently used assessment of receptive language across studies. For studies reporting both expressive and receptive language, the MacArthur-Bates Communicative Development Inventory (CDI) was used by a number of studies therefore these CDI scores were pooled. In addition, studies reporting pre-reading outcomes were pooled together. Seven studies were not able to be pooled in any meta-analysis (Irwin, Justice, Korat, LaCour, Lam, van Bystervelt, Cooper) because they either reported outcomes of a measure not used in any other study or did not report mean and standard deviation scores.

Subgroup analysis and investigation of heterogeneity

We planned to carry out a series of subgroup analyses according to whether mothers or fathers read to their child, for more or less socially disadvantaged populations, for minority or majority ethnic groups, for whether the target group was boys or girls or older or younger children, and finally for the type of study (RCT vs Quasi-experimental) to explore the robustness of the results. We also planned to examine any differences between studies published with data from different countries. In addition, we were interested in whether the

data speak at all to the question of whether children with language learning difficulties responded in the same or different ways to the book reading interventions. In fact, four studies focused on this group of children (Tsybina, Ijalba, Lonigan and Pile). We made the decision to include these studies in our main analysis as the children were language delayed or experienced language difficulties, therefore they did not have a clinical diagnosis of impairment. However, because these studies used different outcomes (CDI, two EOWPVT and one MLU respectively) we cannot reasonably compare them in a sub-group analysis. The only sub group analyses for which sufficient data was reported was for age, social disadvantage and type of study. We were not able to carry out subgroup analysis for whether mothers or fathers read to their child, minority/majority ethnic groups, or for whether the target group was boys or girls. Age subgroups were created based on the mean age of children in the expressive and receptive outcome studies (for example, there were no studies reporting mean age < 2 years for expressive language, but most reported a mean of 2 years (becoming one subgroup) and 4 years (becoming a second). SES subgroups were determined by the participant characteristics reported by the authors. In practice these fell into two categories. Groups were identified as “low SES” – ie socially disadvantaged or, in the US, Head Start populations or unspecified or “mixed” populations. In the latter cases, it was not possible to extract to what extent mixed populations did or did not also include low SES populations. So, direct statistical comparison of these two groups would not have been appropriate because to some extent at least the groups are not mutually exclusive. It is also important to note that, at this sub-group analysis stage, in some cases (for example the studies that focused on low SES groups) we pooled a relatively heterogeneous sample of studies.

In addition to these, post-hoc, it was possible to subgroup data from studies into categories reporting the type of intervention (dialogic vs shared), the frequency of intervention sessions (categorised evenly into 5-week blocks which reflect commonly used intervention durations), the type of parent training (group or individual).

When undertaking subgroup analysis, it is tempting to compare effect estimates between subgroups by considering results from each subgroup separately. While it is acceptable to compare magnitudes of effect informally it is not appropriate to test these differences in terms of statistical significance. Indeed “It is extremely misleading to compare the statistical

significance of the results [in different subgroups]” (Higgins and Green 2011 9:6:3) Indeed formal comparisons between subgroups are best performed by using meta-regression (Harbord and Higgins 2008; Higgins and Thompson 2004).

Summary

The review methodology adopted represents one of the most rigorous approaches to reviewing the literature on parent child reading interventions in the field; based on Cochrane systematic review methodology (<http://training.cochrane.org/handbook>). The process by which the papers were identified and the data extracted was transparent, and accordingly we believe that the review is potentially replicable.

Chapter 4 - RESULTS

Results of the search

Once de-duplicated, the search provided 3080 studies for screening. 59 were selected for full text screening, and 22 were included in the review (16 in the meta-analyses).

Included studies

Table 3 below shows the characteristics of final included studies. Altogether, the studies reported on 751 children receiving intervention, and 569 control group children [total=1320] and were conducted across 5 countries. A PRISMA breakdown of study inclusion and exclusion may be found in Appendix A. The mean age of the children was 39.47 months. A full list of study references may be found in Appendix C. A list of excluded studies together with the reason for their exclusion is given in Appendix D.

By design

The included studies comprised 17 RCTs and 5 quasi-experimental studies. Fifteen studies were carried out in the USA (of which two included Spanish-speaking populations (outcomes were measured in Spanish), one took place in Korea (outcomes measured in Korean), two in Canada (both of which included bilingual populations with one measuring outcomes in English in children whose first language was predominantly English, and one measuring outcomes in English for Spanish-speaking children (Tsybina); this latter study was excluded from the meta-analysis), two in Israel (intervention and reading in Hebrew), two in South Africa (intervention and reading in Xhosa), and one in Hong Kong (outcomes in Chinese). Intervention frequency ranged from two to sixty-eight weeks, and from a single session of 15 minutes to eight sessions of 90 minutes and daily sessions over 17 months of 15-20 minutes. Seven studies provided intervention training to parents individually, eleven in a group, two provided a mixture of individual and group training, and in two studies this was not clearly reported. In fifteen studies, dialogic reading was used as the basis of the intervention; the adult helps the child to become the reader, and the adult takes on a role of active listener and questioner. Five used shared or paired reading; an adult reads to the child without requiring extensive interactions from them. One used enriched reading;

techniques and materials supplemental to the text are added including pointing out the pictures, talking about them and making up original and simple tales about them in order to enrich the speech sound environment. Finally, in one study this was not reported. Four studies included children who had language delays or difficulties. Eleven studies reported on the ethnicity of children which included White, Black African, African American, Spanish, Hispanic, Israeli, Indian and Turkic ethnicities.

Table 3. List of included studies and number of participants.

1st author	Year	Location	Study Design	Type of Intervention	Frequency (weeks)	Parent Training	Intervention N	Control N	Language ability	Mean age (SD) (months)	Bias Rating
Irwin	1960	USA	RCT	Enriched Reading	68	Individual	24	10	Typically Develop.	Baseline 13 months (NR*)	High
Whitehurst	1988	USA	RCT	Dialogic	4	Group	14	15	Typically Develop.	29.4 (4.1**)	Medium
Arnold	1994	USA	RCT	Dialogic	5	Group	36	27	Typically Develop.	28.95 (2.9)	Low
Cronan	1996	USA	RCT	Not Reported	18 sessions	Individual	156	69	Typically Develop.	28 (8.3)	Low
Lonigan	1998	USA	RCT	Dialogic	6	Group	16	27	Lang. Delay	43.95 (5.08)	Medium
Huebner	2000	USA	RCT	Dialogic	6	Group	88	41	Typically Develop.	28.61 (3.21)	Low
Justice	2000	USA	Quasi	Dialogic	4	Group	14	14	Typically Develop.	54 (4)	Medium
Lim	2002	USA	RCT	Dialogic	4	Individual	11	10	Typically Develop.	3.15 (NR)	Low
Blom-Hoffman	2007	USA	RCT	Dialogic	12	Unclear	8	10	Typically Develop.	44.5 (9.2)	Low
Tsybina	2010	Canada	Quasi	Dialogic	6	Individual	6	6	Lang. Delay	27.8 (NR)	Medium
Boyce	2010	USA	RCT	Dialogic	Unclear	Individual	32	43	Typically Develop.	40.12 (10.4)	Low
Pile	2010	Canada	RCT	Shared	9	Group	19	17	Lang. Impairment	53.4 (3.6)	Low
Reese	2010	USA	RCT	Dialogic	Autumn -Spring	Individual	10	11	Typically Develop.	50.8 (3.97)	Low
LaCour	2011	USA	Quasi	Dialogic	7	Group	12	10	Typically Develop.	48 (NR)	High
Aram	2013	Israel	RCT	Shared	6	Group	30	28	Typically Develop.	54.97 (6.77)	Low
Lam	2013	Hong Kong	RCT	Shared	7	Ind.+Group	101	94	Typically Develop.	55 (0.34)	Low
Strouse	2013	USA	Quasi	Dialogic	4	Unclear	20	20	Typically Develop.	42 (4)	Medium
Korat	2013	Israel	RCT	Shared	2	Individual	60	30	Typically Develop.	56.1 (NR)	Medium
Kotaman	2013	USA	RCT	Dialogic	7	Group	16	20	Typically Develop.	45 (1.2)	Medium
Cooper	2014	South Africa	RCT	Dialogic	6	Ind.+ Group	17	13	Typically Develop.	15.42 (1.56)	Medium
Vally	2015	South Africa	RCT	Shared	8	Group	49	42	Typically Develop.	15.45 (0.71)	Low
Ijalba	2015	USA	RCT	Dialogic	12	Group	12	12	Lang. Delay	43 (1.95)	High
							$\Sigma=751$	$\Sigma=569$		$\mu=39.47$	
*NR- Not Reported, **-Decimal places vary due to study information available											

By outcome

A variety of expressive and receptive language outcomes were reported in the studies. Six studies reported Expressive One Word Picture Vocabulary Test (EOWPVT: Arnold, Huebner, Ijalba, Lonigan, Strouse, Whitehurst), one reported Expressive Vocabulary Test (EVT:Reece), four Illinois Test of Psycholinguistic Abilities (ITPA: Arnold, Huebner, Lonigan, Whitehurst), four Communicative Development Index (CDI: Cronan, Ijalba, Tsybina, Vally), and one Pre-school Language Scale-4 (PLS-4: Ijalba). Three studies reported the number of unique or different words used by the child (Boyce, Lim, Pile), and one used SALT (Huebner). In terms of receptive vocabulary, nine studies reported PPVT (Aram, Arnold, Cooper, Huebner, Korat, Kotaman, Lonigan, Vally, Whitehurst or a modified version for language), three studies reported an author-derived measure of receptive vocabulary (Cronan, Lam, Korat).

By intervention

Fifteen studies reported on dialogic reading, and five reported on shared reading, the difference between these being that dialogic reading is more structured and involves specific strategies such as the use of questions from the parent to the child. Shared reading is more typical of the type of reading likely to already exist in the home.

Risk of bias in included studies

Only two of the studies were judged to be at low risk of selection bias because they clearly reported the method of sequence generation (the method used to allocate participants to intervention or control group) and allocation concealment (adequate concealment of allocations to intervention or control group prior to assignment) (Pile, Vally). The quasi-experimental studies were judged to be at high risk in this domain because, by definition they were not randomised and the allocation was known to the investigators (Irwin, Justice, LaCour, Strouse, Tsybina). The remaining fifteen RCTs were judged as being unclear in this domain because they were described merely as 'randomized' with no further detail. Three were judged at low risk of performance bias because the outcome assessors were stated to be blinded to the assignment of the participants (Huebner, Pile and Vally), and three were at high risk (Strouse, Justice and LaCour); the other sixteen studies did not report whether

outcome assessors were blinded or not. Only two studies had attrition in data for participants. None were judged to have selective reporting.

The results below are reported as for the different expressive language outcomes followed by those for receptive language and pre-reading measures. In each case the specific analyses are followed by subgroup analyses as specified above.

Subgroups

The table below indicates which subgroups analysis was conducted for each outcome; results of these are presented within each outcome category below.

Table 4: Subgroup analysis conducted for each outcome category.

Subgroup	Outcome		
	Expressive Language	Receptive Language	Pre-Reading
Age	✓	✓	X
SES	✓	✓	X
Type of Intervention (Dialogic/Shared)	X	✓	✓
Frequency of Intervention	✓	✓	✓
Type of Parent Training (Group/Individual)	✓	✓	✓
Type of study (RCT/Quasi)	✓	X	X

Although it was not possible conduct a subgroup analysis to explore whether children with language learning difficulties responded in the same or different ways to the book reading interventions, there were some trends in their data that may be commented on. It is possible to say that the Tysbina data gave rather higher scores in line with the argument that parent report outcomes deliver higher results. The same is true in the Ijalba study with the CDI and for the EOWVT used in the same study. The Lonigan and Pile studies had altogether more modest, albeit positive, results again with different outcomes. These

results would suggest that there is no a priori reason for assuming children with greater initial language difficulties would do less well in the context of such interventions.

Expressive Language and Vocabulary

Main analysis: Expressive language outcomes from studies reporting the Expressive One Word Picture Vocabulary Test (EOWPVT)

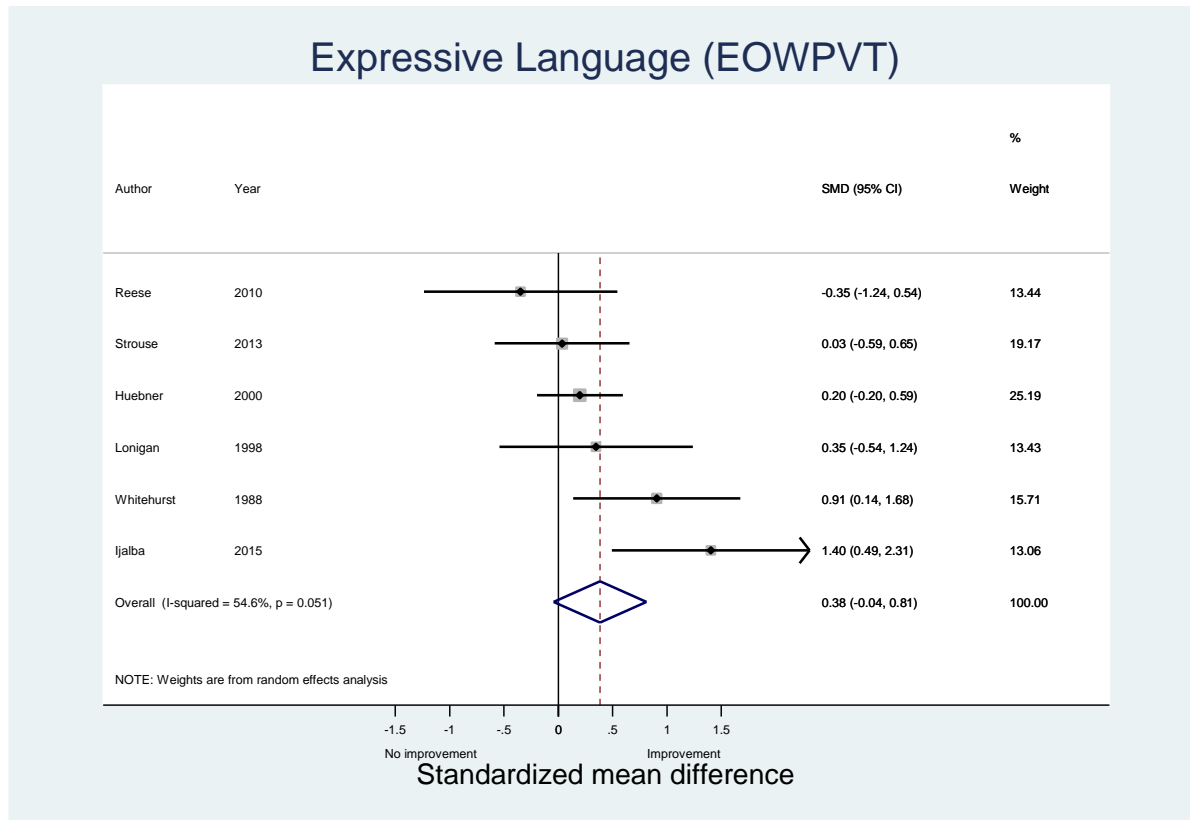
Six studies reported EOWPVT (Arnold, Huebner, Ijalba, Lonigan, Strouse, Whitehurst), and one reported EVT (Reece). One study did not report raw data in a usable format (mean scores) (Arnold) but reported the significance (p) value.

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Results are displayed in forest plots. Forest Plots display effect sizes which represent the extent to which the intervention made an impact on a specific outcome (i.e. expressive vocabulary, number of different words, receptive vocabulary). The solid vertical line down the centre of each plot represents no effect in the specified outcome. Each study is allocated a horizontal line which represents the confidence interval, reflecting uncertainty/precision in the summary measure. The horizontal line sometimes called the “prediction interval” represents the heterogeneity/dispersion of effect sizes. A horizontal line which lies to the right of the solid line represents improvement/positive effect, and a horizontal line which lies to the left represents no improvement/negative change. In some cases, this horizontal line will overlap the vertical line of no effect; sitting both to the left and right of the solid no-change line. This suggests that the intervention may have different effects on different children which, in turn, makes it difficult to predict the result of subsequent studies. An analysis is said to “homogeneous” if the results of the individual studies cluster together and “heterogeneous” if they are dispersed.

The meta-analysis of these five studies (Figure 1) suggests that when parents received an intervention, the EOWPVT scores of their children were higher (SMD=0.38, medium effect size) compared to no intervention. The overall estimate and confidence interval crossed the line of no effect (95% CI= -0.04 to 0.81), indicating this is marginally insignificant (p=0.051), however there is a definite trend towards positive improvement. The amount of heterogeneity was moderate (I-squared = 54.6%).

Figure 1. Meta-analysis results of studies reporting expressive vocabulary outcomes using the EOWPVT/EVT assessment.



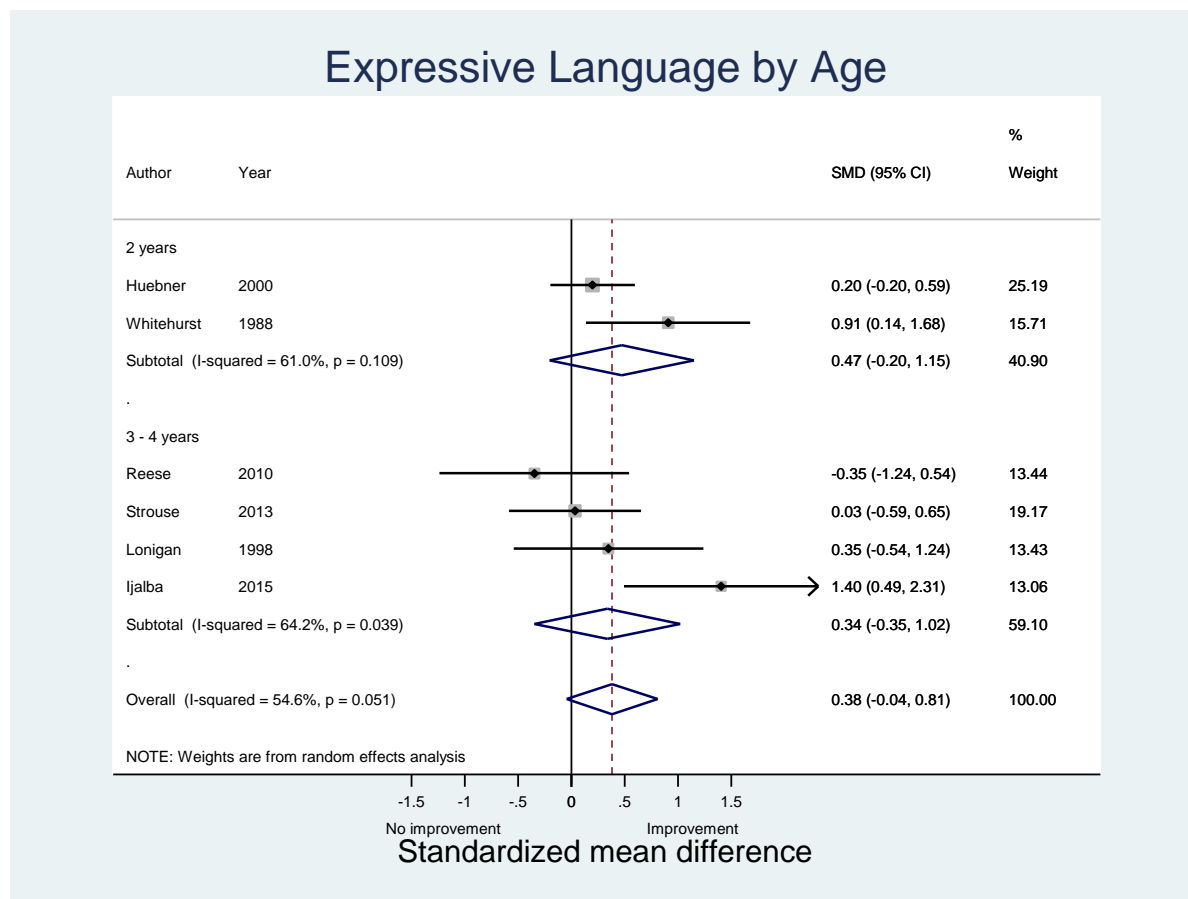
Arnold (1994) could not be included in the meta-analysis but reported on the impact of a 5-week dialogic reading intervention on children with an average age of 28.2 months. Training in the intervention groups was delivered either by video, or direct instruction. Significant group differences were found for the EOWPVT assessment with the intervention group whose mothers received training by video scoring higher than those whose mothers received direct instruction or the control group ($p=0.03$).

Subgroup analysis: Expressive language and age

Of the studies included in the EOWPVT meta-analysis, none included a mean age of less than 2 years, two (Huebner, Whitehurst) enlisted mostly children of 2 years, and four (Strouse, Lonigan, Ijalba, Reese) recruited children of 3-4 years.

The expressive forest plot by child age subgroups, 2 years and 3 to 4 years, Figure 2, illustrates that there was no statistical difference in either of the age groups ($z = 1.37, p = .170$ and $z = 0.96, p = 0.335$ respectively) in the improvement of those language scores, although this result should be treated with caution because there are few studies in each group, and moderate to high levels of heterogeneity (61% for 2 years and 64% for 3-4 years).

Figure 2. Expressive subgroup analysis results for age.

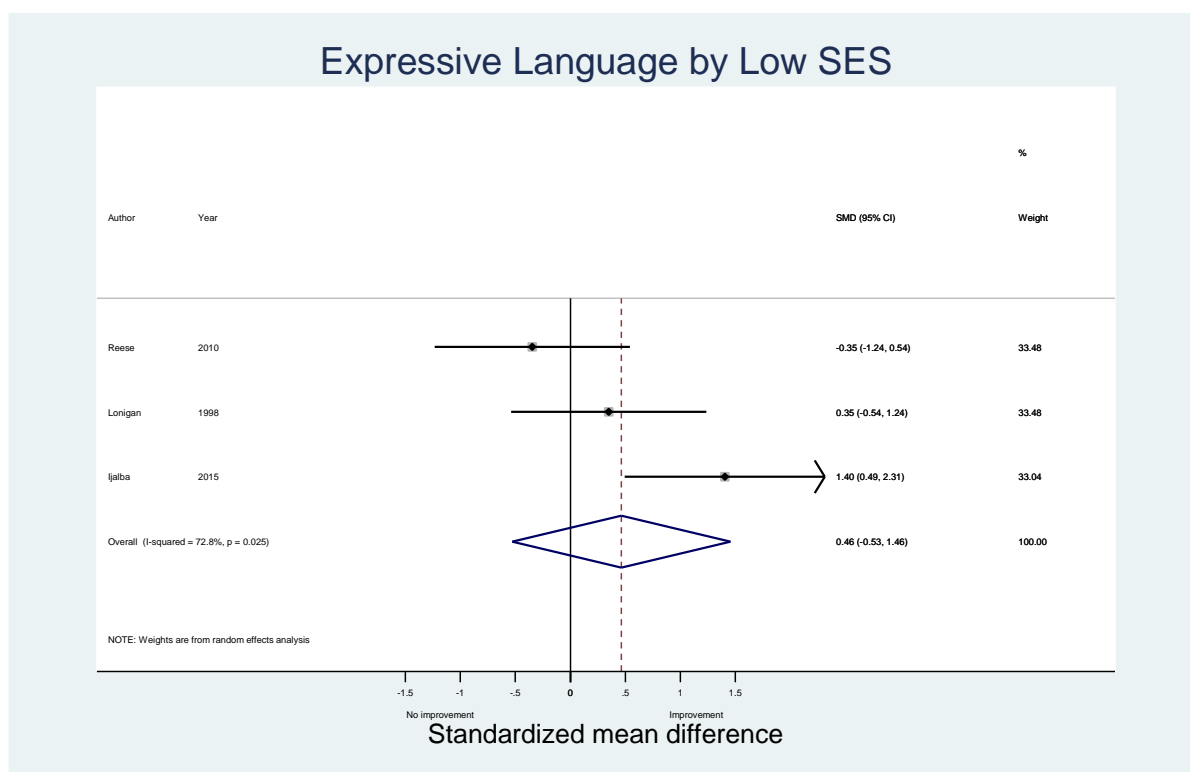


Subgroup analysis: Expressive language and low SES studies

The subgroup analysis incorporating only studies which recruited families of lower SES (Figure 3) indicated significant heterogeneity and a summary of no effect. The results here suggest that those studies with clearly identified low SES populations on the one hand have a comparable level of outcome to the whole group of studies that used the EOWPVT. In fact if we compare these with the others in the group their outcome cover a wide range (Reese having the lowest outcome, Ijalba the highest and Lonigan having an outcome which is comparable to the group as a whole). The study-specific estimates suggest little overlap between Ijalba and Reese. The heterogeneity was 72.8% and is supported by the chi-square test ($\chi^2=7.35$ (df = 2) $p=.025$).

This suggests that, given the importance of this question, there is a case to be made for more explicit testing of the proposition that low SES groups tend to respond differently to parent-child book reading interventions.

Figure 3. Expressive subgroup analysis results for SES.

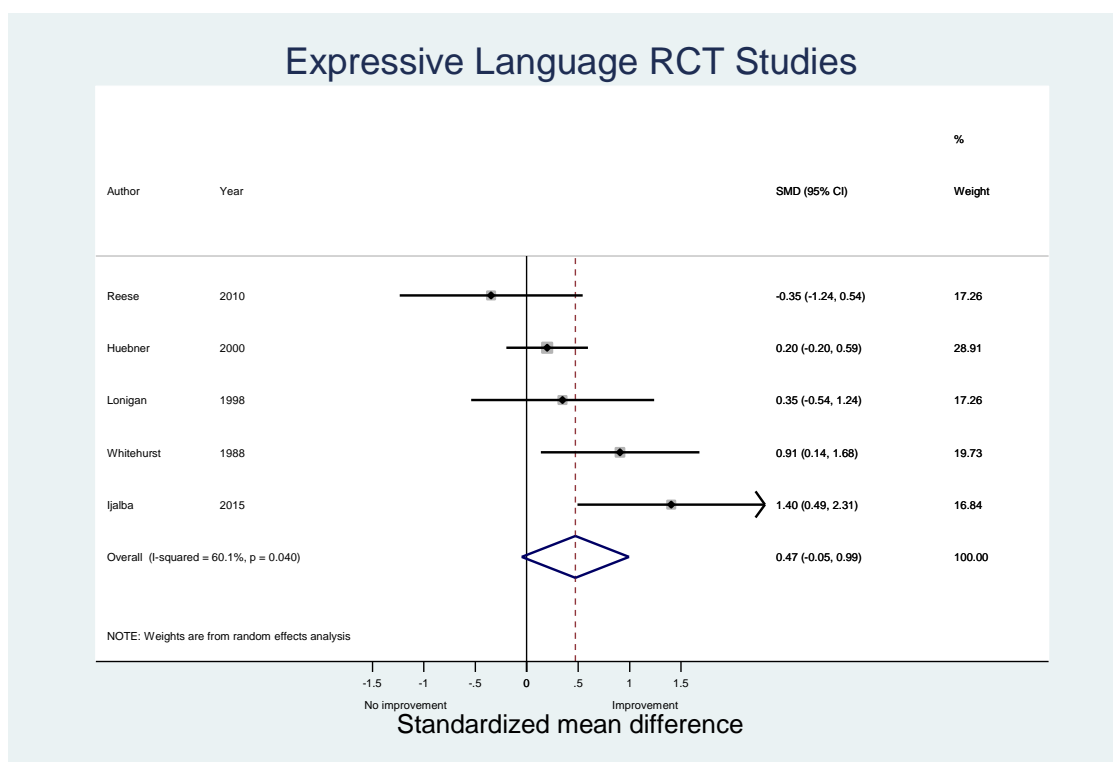


Subgroup Analysis: Expressive language and RCT studies only

In this sub-group analysis we pooled a relatively heterogeneous sample of studies (in terms of specific outcomes) comparing those with and without RCT designs. The expressive language forest plot for the RCT studies only, Figure 4, suggests that the associated interventions were overall more effective than control in improving children's scores. The overall SMD of 0.47 incorporates the line of no effect (95% CI -0.04, 0.99) implying that in a future study it is possible that a control group might be no different to the intervention ($z=1.78$, $p = .075$). Again, the confidence intervals of the Ijalba and Reese studies are very different, but there is some overlap between the confidence intervals of the other studies. There is a large amount of heterogeneity (60.1%) and this is supported by the chi-square test ($\chi^2=10.03$ (df = 4) $p=.040$).

One of the studies in figure 1 is not a randomised trial and therefore might be expected to produce a less robust result (as it is of lower quality) than the RCTs in the analysis. However, omission of this trial (Strouse) from the analysis (figure 4) demonstrated little difference in the estimate of effect on EOWPVT (SMD=0.47, 95% CI -0.047 to 0.99) indicating the result is robust.

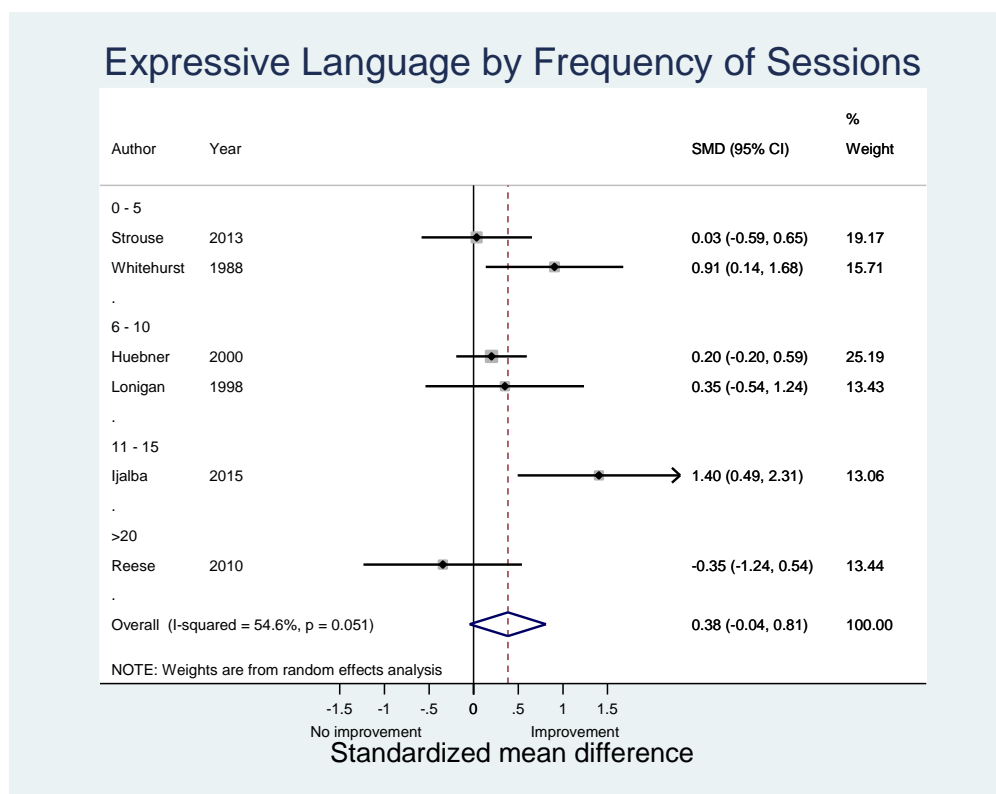
Figure 4. Expressive subgroup analysis results for RCT studies only.



Subgroup Analysis: Expressive language and frequency of intervention sessions

The forest plot expressive language by intervention frequency subgroups (0 to 5 weeks, 6 to 10 weeks, 11 to 15 weeks and more than 20 weeks) is given in Figure 5. The outcome of this subgrouping appears to suggest that only the 11 to 15 weeks subgroup found the intervention to be more effective than control ($p=0.003$), while the other subgroups were no more effective than control in the improvement of those expressive language scores ($p>0.05$). In addition, only one study reported an intervention that included 11-15 sessions, and this study had a large positive effect size. Therefore, although an interpretation is provided here, this results within each group should be treated with caution.

Figure 5. Expressive subgroup analysis by frequency of intervention sessions.



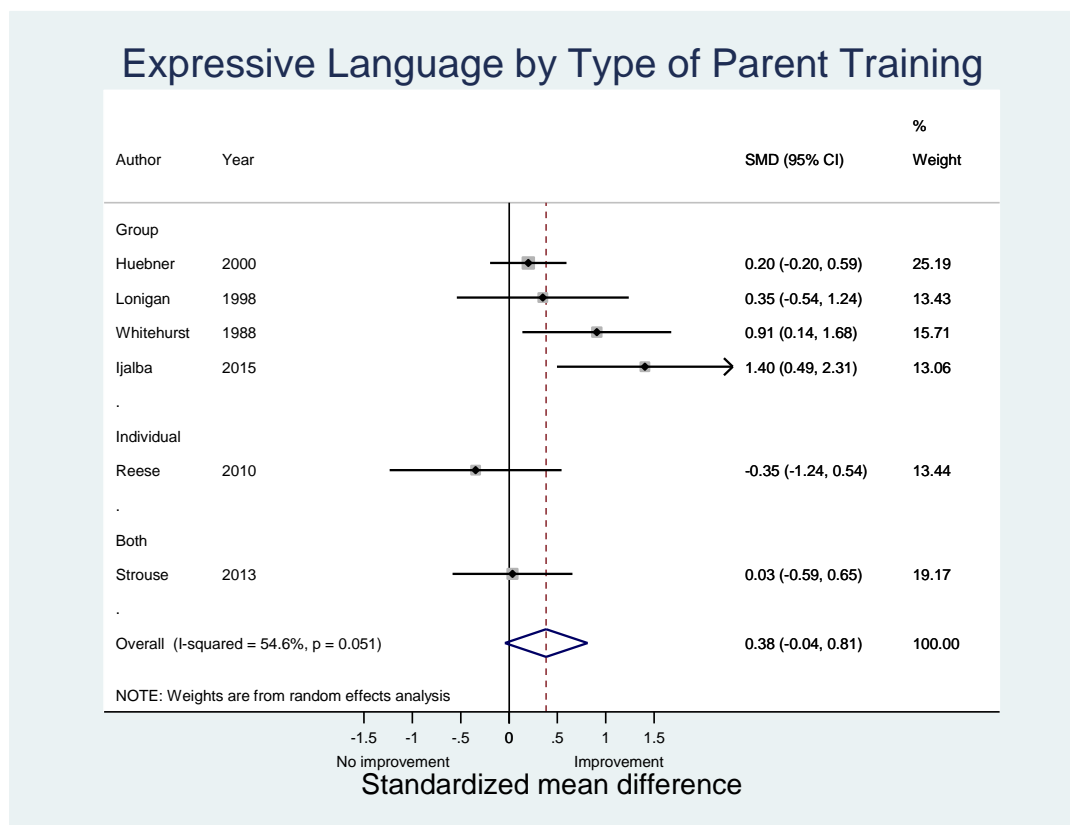
Subgroup analysis: Expressive language and type of intervention.

All of the studies reporting expressive outcomes used a dialogic intervention and none a shared reading intervention, so we were unable to subgroup analysis by type of intervention.

Subgroup Analysis: Expressive language and type of parent training

The subgroup analysis exploring the type of parent training is problematic as only one study in the analysis reported individual training and one study reported a combination of group and individual training, therefore it is difficult to draw any firm conclusions. The expressive forest plot by type of intervention training (Group, Individual, or both, Figure 6) illustrates that for this outcome only the group training interventions were more effective than control ($z=2.28$, $p=.023$). The other subgroups were no more effective than control in the improvement of those expressive language scores (Individual - $z=0.76$, $p=.44$ and both - $z=0.11$, $p=0.91$). The group training subgroup showed no significant heterogeneity ($\chi^2=7.15$ ($df=3$), $p=.067$). As mentioned above, whilst this outcome is supportive of group training, it is difficult to draw firm conclusions from this due to limited number of studies. However, it does highlight a need for further exploration of the impacts of differential parent training methods.

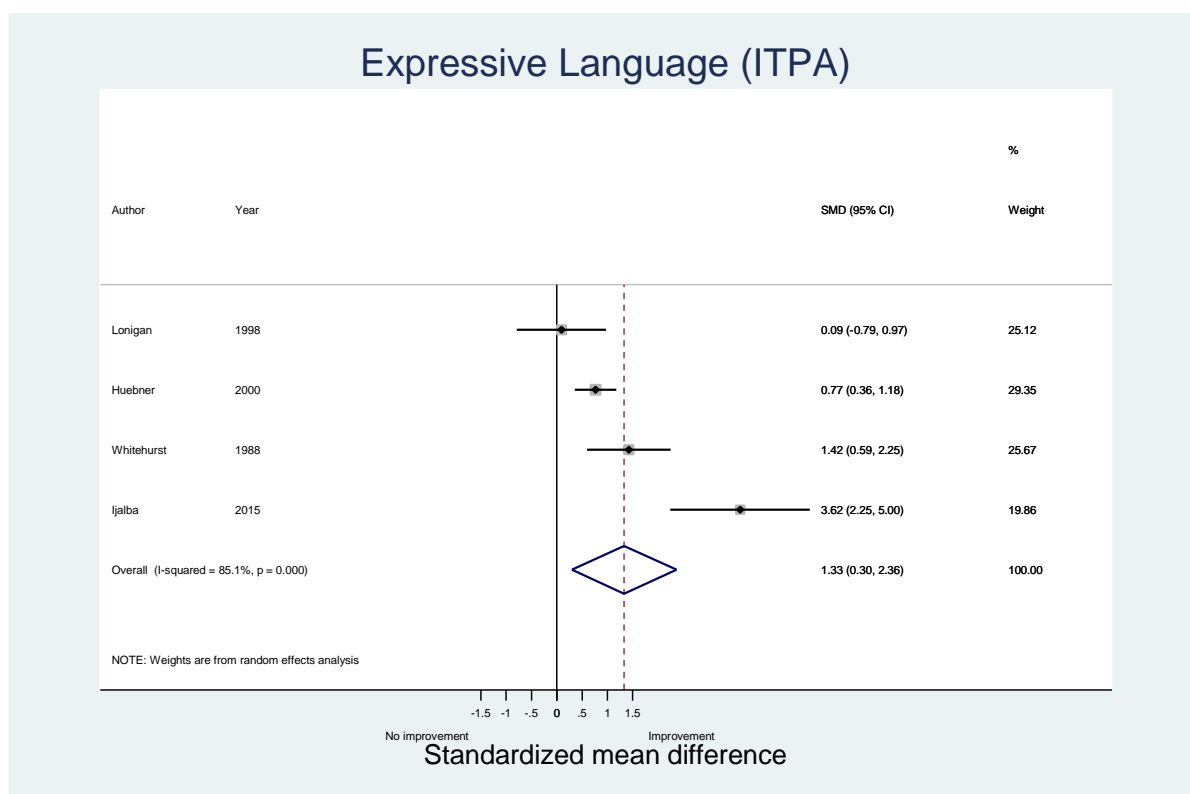
Figure 6. Expressive subgroup analysis for type of training provided to parents



Main analysis: Expressive language outcomes from studies reporting the Illinois Test of Psycholinguistic Abilities

Four studies reported ITPA (Arnold, Huebner, Lonigan, Whitehurst), and one study reported the expressive element of the PLS-4 (Ijalba). One study did not report raw data in a usable format (Arnold) as it did not report means and standard deviations. The meta-analysis pooling results for this outcome from these four studies showed that when parents received an intervention, their children increased their ITPA score compared to the control group (large effect size: SMD = 1.33 (95% CI 0.30 to 2.36). It is important to note that the overall effect is heavily influenced by the Ijalba study which has a large effect size, and by Heubner and Whitehurst which are more precise and have a higher percentage weight. However, all studies point in the same direction so overall effect is likely to be positive.

Figure 7. Meta-analysis results for expressive language outcomes based on the ITPA assessment.



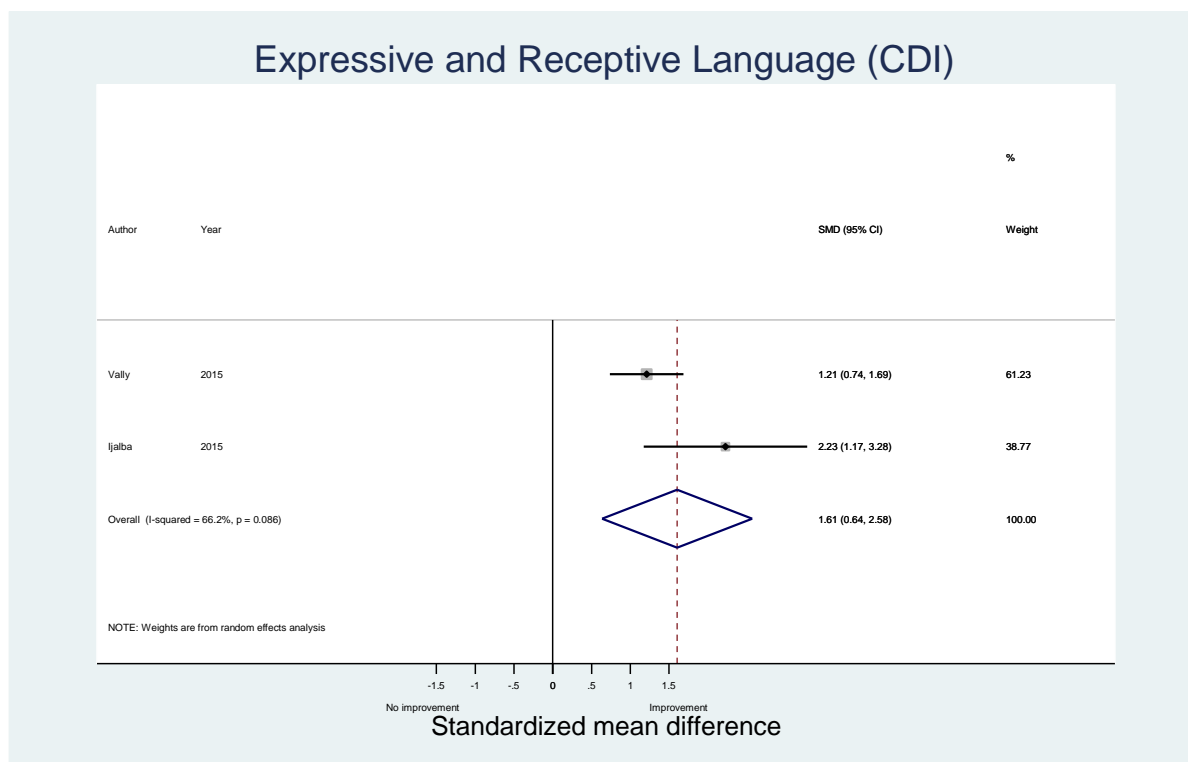
Arnold (1994) could not be included in the meta-analysis but reported on the impact of a 5-week dialogic reading intervention on children with an average age of 28.2 months. In this

study, significant group differences were found for ITPA-verbal expressive subscale with the intervention group whose mothers received training by video scoring higher than those whose mothers received direct instruction or the control group intervention group scoring higher $F(2,58)=4.29$, $P=0.02$. The direct training group outperformed the control group on the ITPA-verbal expressive subscale, $F(1, 59)= 5.39$, $P=0.02$.

Main analysis: Expressive and receptive language outcomes from studies reporting the Communicative Development Index

Four studies reported CDI that reports on children's expressive and receptive language (Cronan, Ijalba, Tsybina, Vally). Two did not report SDs (Cronan, Tsybina), and one (Tsybina) reported change scores; these were not included in the meta-analysis. The CDI forest plot, Figure 8, illustrates that for parents who received the interventions, their children had higher CDI scores at follow-up than those in the control group ($z=3.25$ $p = .00$).

Figure 8. Meta-analysis results for language outcomes based on the CDI assessment.



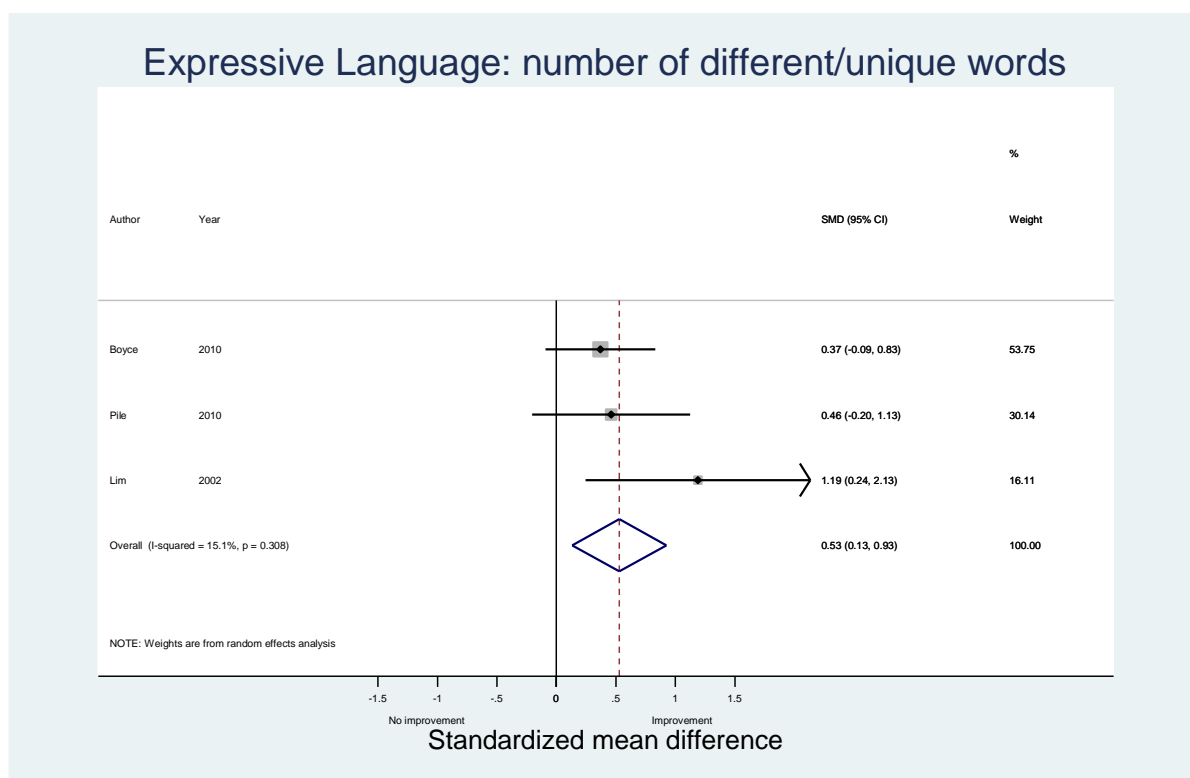
Cronan (1996) could not be incorporated into the meta-analysis but reported on the impact of a parent training programme on low-income children's expressive language, measured by the CDI. Children in the high-intervention group (receiving 18 home visits) showed significantly greater increases in their mean CDI percentile scores than children in the control group; $t(110) = 2.65$, $p=0.00$. Tsybina reported that children who received dialogic booking reading intervention significantly increased their target word learning compared to controls ($p=0.00$), however there were no significant group differences in overall vocabulary

gains. The average overall vocabulary gain for the intervention group was 51 words and for the control group was 28.7 words. The key issue here is that the CDI is a commonly used measure because it is a parent report measure and thus easy to administer. The fact that we obtained relatively much higher effect sizes for the studies using this measure suggest that it may be inflating the outcome and thus may not be the measure of choice for parent/child book reading interventions.

Subgroup analysis: Expressive language and number of different/unique words

Three studies (Boyce, Lim, Pile) reported the number of different or unique words that children used during the assessments. The pooled result indicated that when parents received an intervention, their children increased the number of different words used compared to control groups with low heterogeneity (medium effect size: SMD = 0.53 (95% CI 0.13 to 0.93), although overall effect was non-significant ($p=0.308$).

Figure 9. Meta-analysis results for number of words learnt



Irwin (1960) tested the effect of systematic reading of stories on children's phonetic production. Spontaneous vocalisation was recorded by pen and paper in the international phonetic alphabet over 4 months for 24 children in the intervention group and 10 children in the control. Significant group differences were found between groups (reported as 'at or beyond the 5% level') after 4 weeks of intervention, with marked group differences after 2 months of intervention when children were 22 months of age.

Receptive Language and Vocabulary

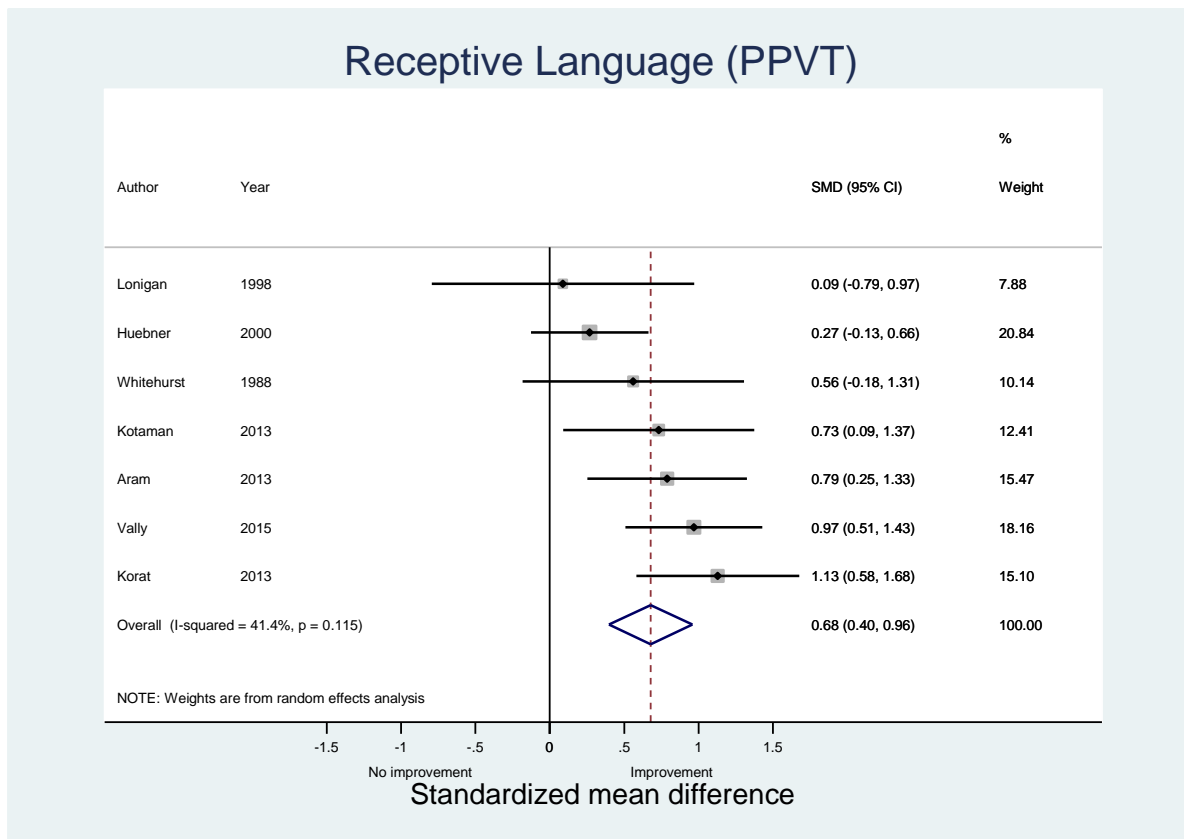
Main analysis: Receptive language outcomes from studies reporting the Peabody Picture Vocabulary Test (PPVT)

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Nine studies reported PPVT (Aram, Arnold, Cooper, Huebner, Korat, Kotaman, Lonigan, Vally, Whitehurst). Two studies (Arnold, Cooper) reported effect size and P value and were not included in the meta-analysis as they did not report the appropriate data (post-intervention mean scores and standard deviations).

The meta-analysis demonstrated (Figure 10) that when parents received an intervention, their children achieved higher PPVT scores at follow-up than those in the control group (medium effect size: SMD=0.68 (95% CI 0.4 to 0.96). The study-specific estimates suggest that the results are relatively homogenous. This absence of heterogeneity is supported by the chi-square test ($\chi^2=10.25$ (d.f. = 6) $p=.11$). The amount of heterogeneity was low (I-squared = 41.4%).

Figure 10. Meta-analysis results for receptive vocabulary outcomes based on the PPVT assessment.



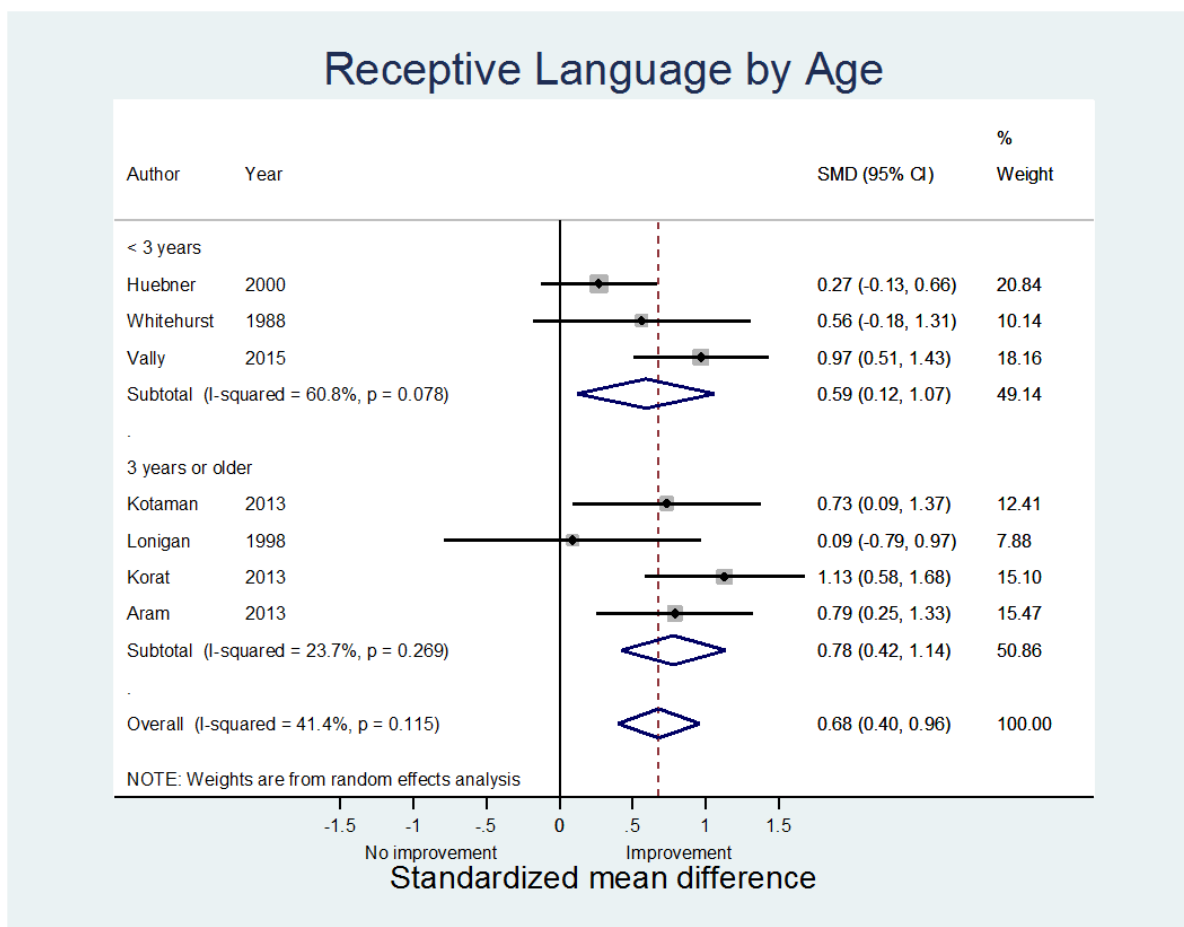
The two studies not in the meta-analysis reporting effect size and p values were Arnold (1994) and Cooper (2014). Arnold (1994) reported on the impact of a 5-week dialogic reading intervention on children with an average age of 28.2 months. Significant group differences were found for PPVT outcomes with the intervention group whose mothers received training by video scoring higher than those whose mothers received direct instruction or the control group ($p=0.03$). Cooper (2014) reports on intervention delivered to an impoverished community in South Africa, and outcomes are reported below in-line with the SES subgroup analysis.

Lam (2013) reported on the impacts of a 7-week intervention on 4-year old children's word recognition (receptive language). The study using the authors' own measure of word recognition. Results indicated that children in the intervention group recognised more words than children in the control group at post-test ($p=0.00$).

Subgroup analysis: Receptive vocabulary and age

The receptive vocabulary forest plot by child age subgroups, Figure 11, illustrates that the interventions were more effective than control overall for all age subgroups. When these studies were categorised according to the age of the children (specifically greater or less than three years). The subgroup analysis (Figure 11) suggested that the effect of the intervention may be slightly reduced in children less than three years old (tests of subgroup differences; < 3 years $z=2.46$ $p=0.014$, 3 years or older - $z=4.26$, $p=0.000$).

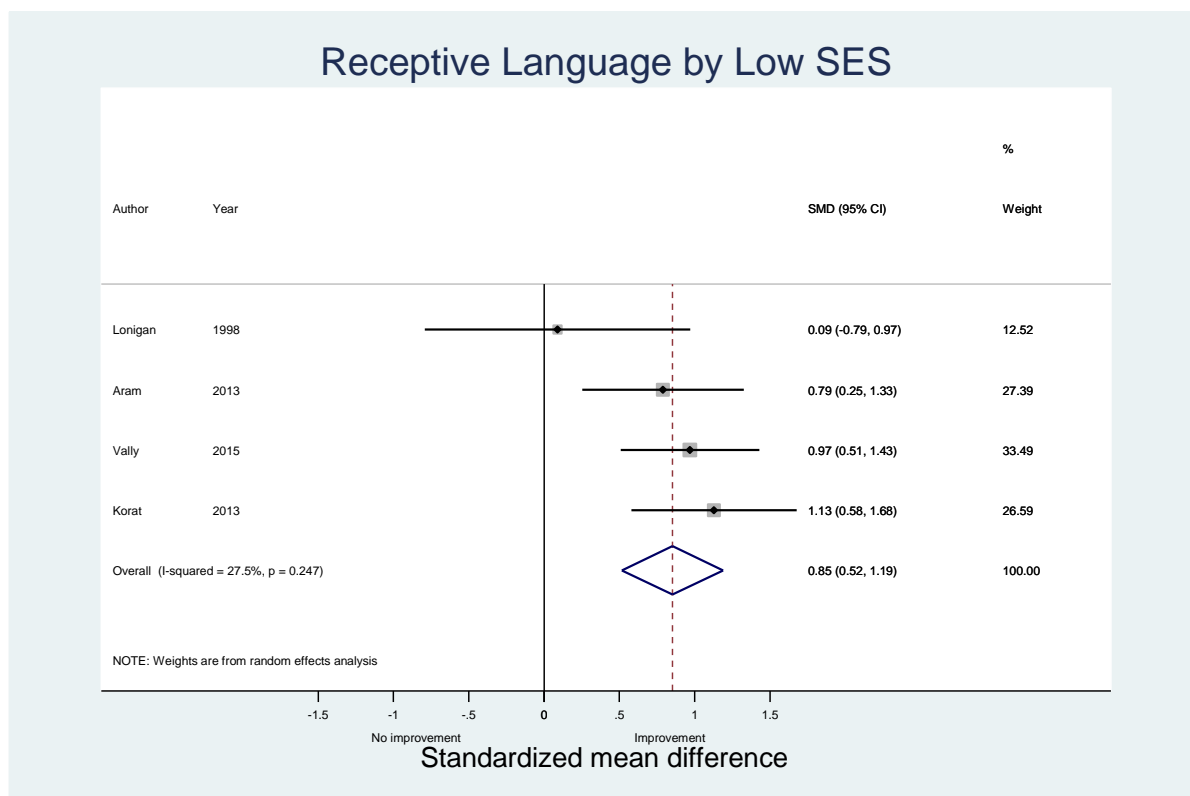
Figure 11. Subgroup analysis results for receptive outcomes by age.



Subgroup Analysis: Receptive vocabulary and low SES only

The receptive language summary forest plot of only the low SES group, Figure 11, illustrates that here the interventions were more effective than the control, ($z = 3.49$, $p < .00$), in the improvement of those language scores with the pooled estimate being 0.742 (95% CI 0.32, 1.15). If we look at these four studies within the context of the seven studies include in Figure 10 above we see that while the outcomes for Lonigan are relatively low those for Aram, Vally and Korat, which are amongst the most recent studies, report effects at the higher end and appear to be pulling the mean effect up, suggesting that in recent studies at least parent-child reading interventions have a distinct role to play for the low SES group. The within study-specific estimates are relatively homogenous with the confidence intervals overlapping across the studies. This absence of within group heterogeneity is supported by the chi-square test ($\chi^2 = 3.01$ (df = 2) $p = .22$).

Figure 12. Subgroup analysis for receptive vocabulary outcomes by SES



Cooper (2014) reports on intervention delivered to an impoverished community in South Africa. The intervention involved book sharing with mothers of children aged 14-18 months

old. Assessment of receptive vocabulary was researchers' own, modelled on the PPVT. Children who received intervention showed an increase in comprehension score ($\chi^2=4.87$, $df=1$, $p<0.02$) and vocabulary score ($\chi^2=4.51$, $df=1$, $p<0.02$).

Significant change in 4-year-old low-SES children's word comprehension from pre- to post-test was reported in Korat (2013) in two intervention groups; one which used a printed book, one which used an e-book (p values not reported). This finding suggests that parent-child book-reading practices be expanded to include e-books.

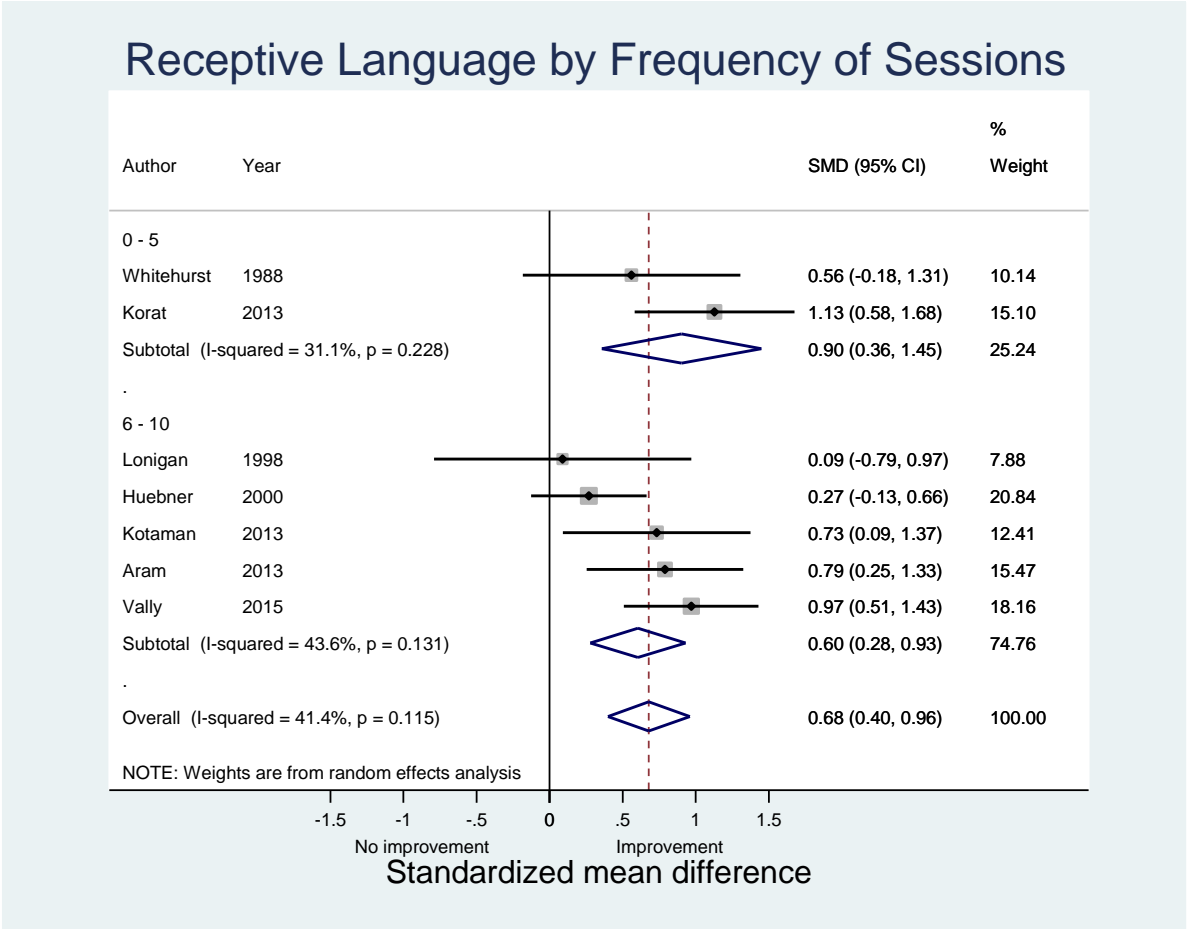
In addition to the above studies, LaCour (2011) reported on intervention for low-income children ages 4 years old and reported on emergent literacy skills, specifically their Readiness for Reading measured by the Comprehensive Inventory of Basic Skills-Revised (CIBS-R). After 7 weeks of intervention, no significant group differences were found on the Readiness for Reading assessment.

Subgroup Analysis: Receptive vocabulary and frequency of intervention sessions

The forest plot for receptive language by intervention duration subgroups (0-5 weeks, 6-10 weeks), Figure 12, illustrates that the interventions were more effective than control for both these subgroups, 0 – 5 and 6 – 10, ($z = 3.25$, $p = 0.001$ and $z = 3.64$, $p = < 0.00$, respectively) in the improvement of those language scores. Therefore, intervention has a positive effect on children's receptive language whether frequency of sessions is 0-5 or 6-10 weeks. However, the effect sizes for these groups indicates that 0-5 weeks has a larger effect size (0.9) therefore may be more likely to produce greater effects than 6-10-week deliveries, however this must be interpreted with great caution as it is based on the outcomes of 2 studies only.

The within group-specific estimates are relatively homogenous with confidence interval overlapping across the studies. The amount of heterogeneity was low (I-squared = 31.1% and 43.6% respectively). This absence of heterogeneity is also supported by the chi-square tests for the 0-5 and 6-10 ($\chi^2 = 1.45$ (df = 1) $p = .22$ and $\chi^2 = 7.09$ (df = 4) $p = .13$). Therefore, studies in this analysis each reported the same positive outcomes for receptive language as the vast majority of children receiving intervention improved in receptive language outcomes.

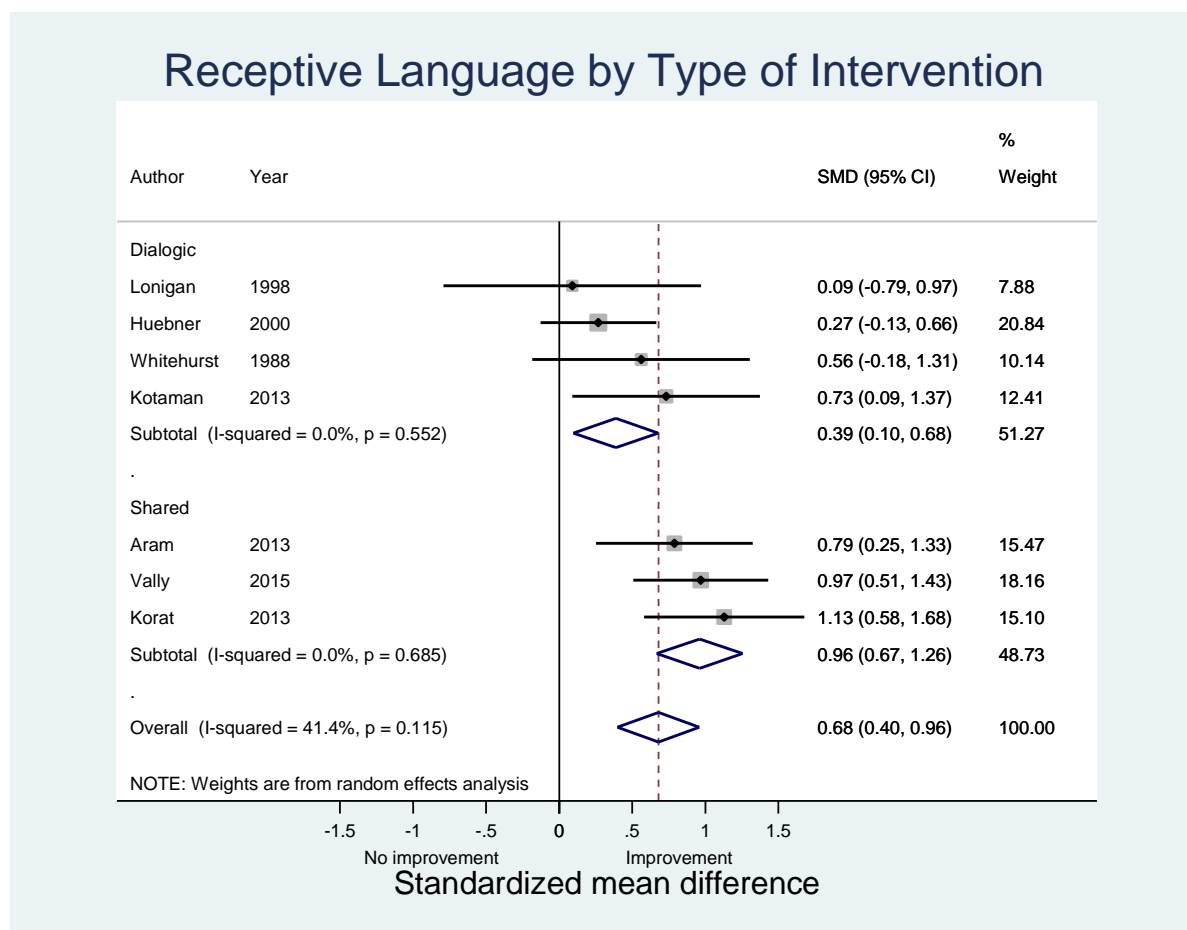
Figure 13. Receptive vocabulary subgroup analysis for frequency of intervention.



Subgroup Analysis: Receptive language and type of Intervention

Studies were categorised according to whether parents in the intervention groups received training in using a dialogic or shared reading technique. The subgroup analysis (Figure 14) showed that shared reading interventions appeared to produce a larger effect on children's PPVT scores than dialogic reading interventions (SMD = 0.96 (95% CI 0.67 to 1.26) versus 0.39 (95% CI 0.10 to 0.68) respectively). When categorised in this way, there was low heterogeneity overall and within each subgroup. The differences between the SMDs are Dialogic- $z = 2.6$, $p = 0.009$, Shared- $z = 6.39$ $p = 0.000$.

Figure 14. Receptive subgroup analysis by type of intervention.

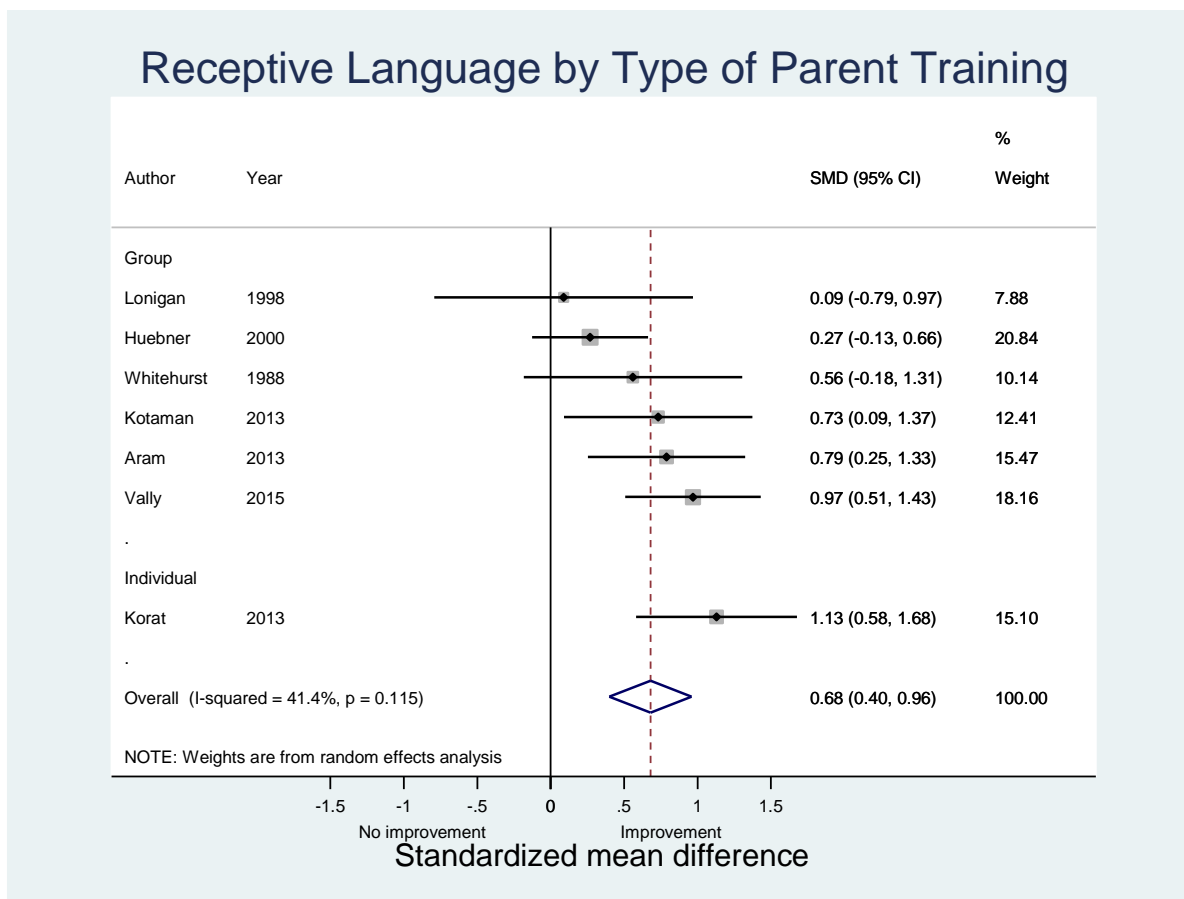


Subgroup Analysis: Receptive language and type of parent training

The forest plot for receptive language by type of training subgroups (Group and Individual), Figure 15, illustrates that the interventions were more effective than control for both these subgroups, Group and Individual, ($z = 4.26$, $p < .00$ and $z = 4.04$, $p = < 0.00$ respectively) in the improvement of those language scores. Therefore, both group training and individual training leads to positive language outcomes. However, it is important to note that only one study reported individual parent training.

The Group study-specific estimates are relatively homogenous with confidence intervals overlapping across the studies. The amount of heterogeneity was low in the Group subgroup ($I^2 = 29.6\%$). This absence of within group heterogeneity is supported by the chi-square tests for the Group subgroup ($\chi^2 = 7.10$ ($df = 5$) $p = .21$). Therefore, across studies children benefited from language intervention that included wither group training or individual training of parents.

Figure 15. Receptive subgroup analysis by type of parent training.



Pre-reading

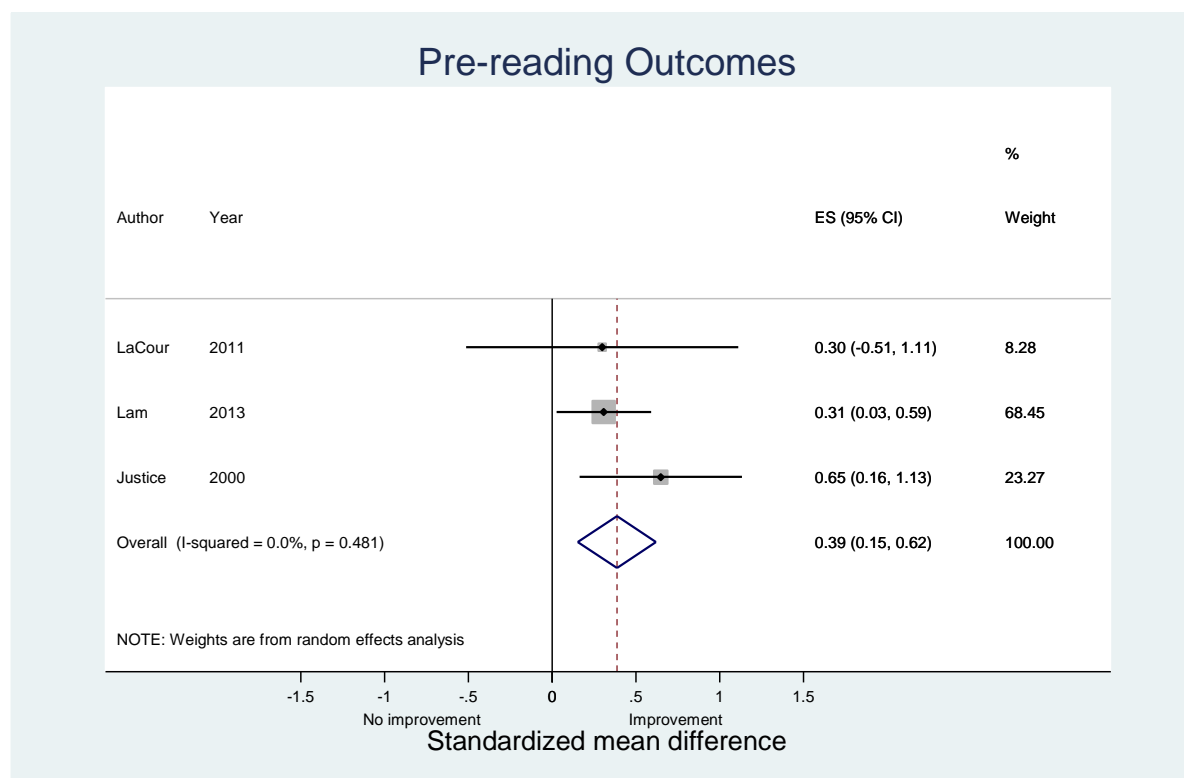
Main analysis: Pre-reading outcomes from studies reporting on pre-reading skills

Three studies reported on change in children's pre-reading skills as a result of intervention (LaCour, Lam and Justice). Pre-reading skills included reading readiness, words in print, alphabet knowledge, word segmentation, print recognition, print concepts and reading fluency. The Pre-reading forest plot, Figure 16, illustrates that for pre-reading outcomes the interventions were more effective ($z=3.24$, $p=.00$) than control in the improvement of pre-reading scores, overall estimate 0.386 (95% CI 0.15, 0.62). Therefore, language interventions had a positive impact on children's pre-reading ability.

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The study-specific estimates are relatively homogenous with confidence interval overlapping across the studies. This absence of heterogeneity is supported by the chi-square test ($\chi^2=1.46$ (df = 2) $p=.48$). Therefore, children across these three studies were on the whole shown to benefit from language intervention in terms of pre-reading outcomes.

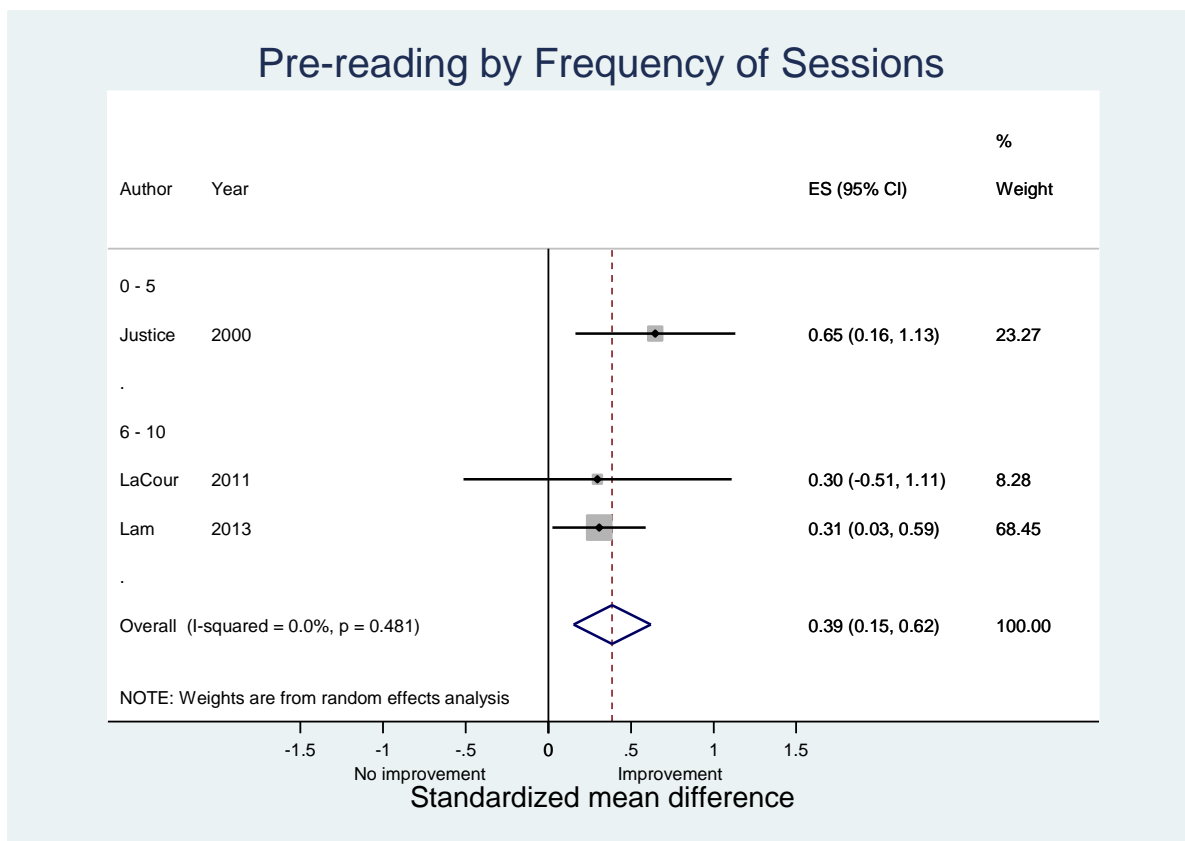
Figure 16. Meta-analysis results for pre-reading outcomes.



Subgroup Analysis: Pre-reading and frequency of intervention sessions

The Pre-reading forest plot by intervention duration subgroups, 0 to 5 weeks and 6 to 10 weeks, Figure 17, illustrates that for this outcome both those subgroups found the intervention to be more effective than control ($z=2.62$, $p=.00$ and $z=2.26$, $p=0.02$, respectively). Therefore, children improved in pre-reading ability whether the intervention frequency of sessions was 0-5 or 6-10 weeks. There is a larger effect size for 0-5 weeks (0.65) suggesting this amount of sessions may be more beneficial to children's pre-reading, however this must be interpreted with great caution as it is based on one study only.

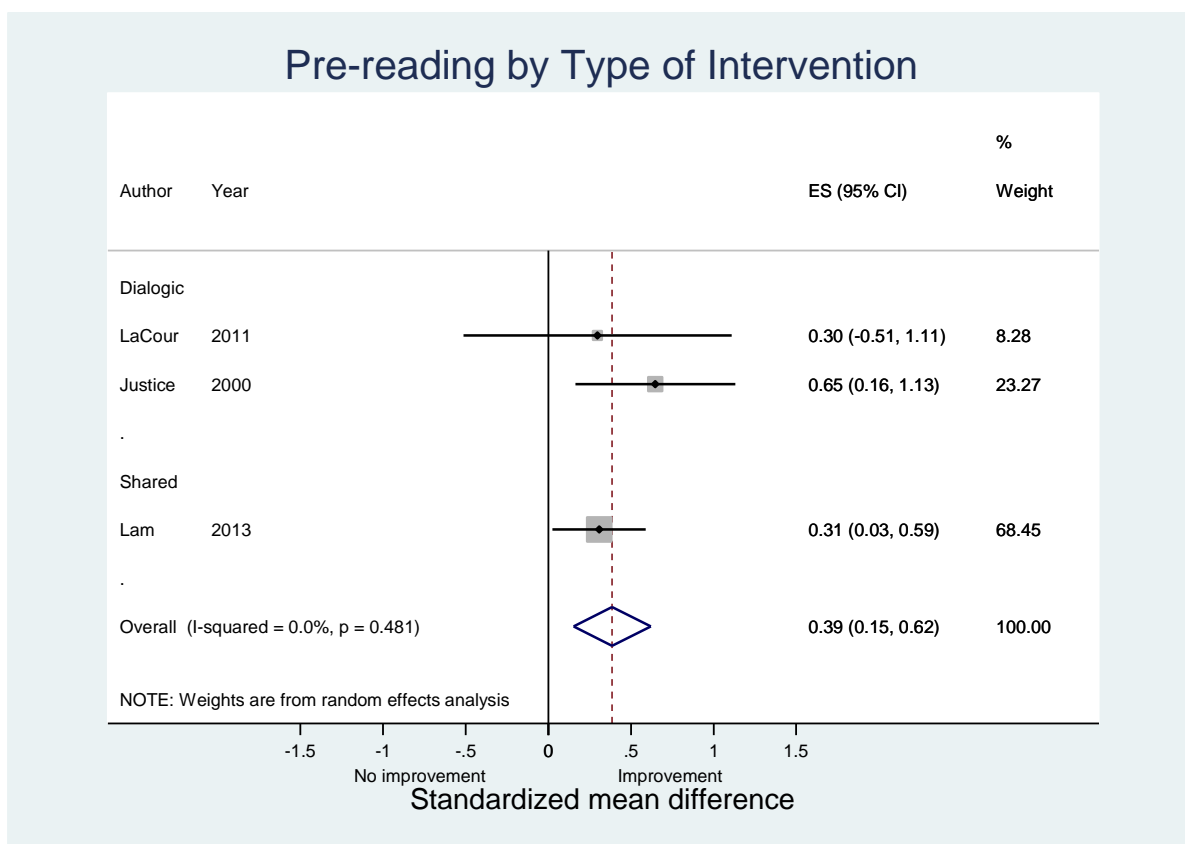
Figure 17. Subgroup analysis for frequency of intervention sessions



Subgroup Analysis: Pre-reading and type of Intervention

The Pre-reading forest plot by intervention type subgroups (Dialogic and Shared), Figure 18, illustrates that those interventions were more effective than control for both these subgroups, Dialogic and Shared, ($z = 2.62$, $p = 0.00$ and $z = 2.14$, $p = .032$ respectively) in the improvement of those language scores. Therefore, children benefit in pre-reading skills whether the reading intervention is dialogic or shared.

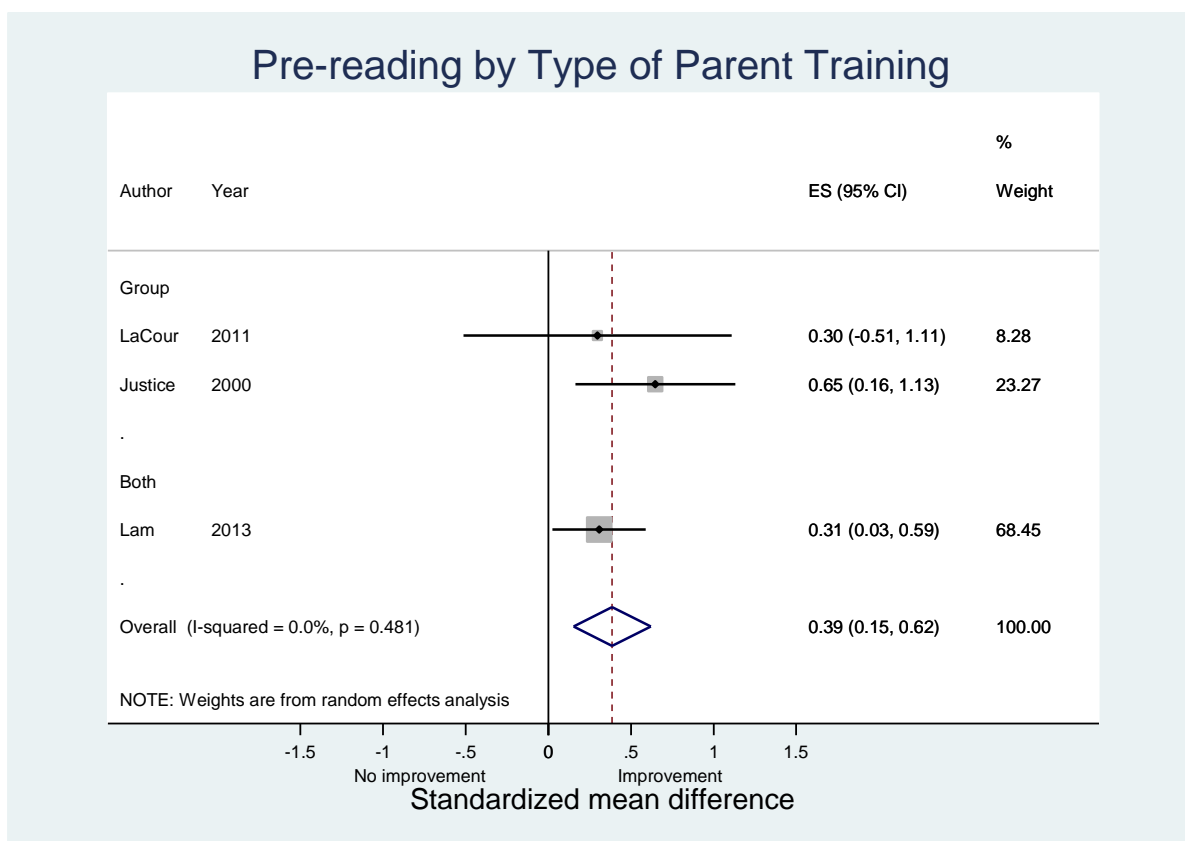
Figure 18. Subgroup analysis rereading by type of intervention



Subgroup Analysis: Pre-reading and type of parent training

The Pre-reading forest plot by type of parent training subgroups, (Group, Individual and both) are given in Figure 19. This illustrates that both groups are effective relative to control (Group - $z=2.62$, $p= .00$ and Both – $z=2.14$, $p=0.03$). Therefore, children improve in pre-reading ability whether parent training is delivered in a group or individually.

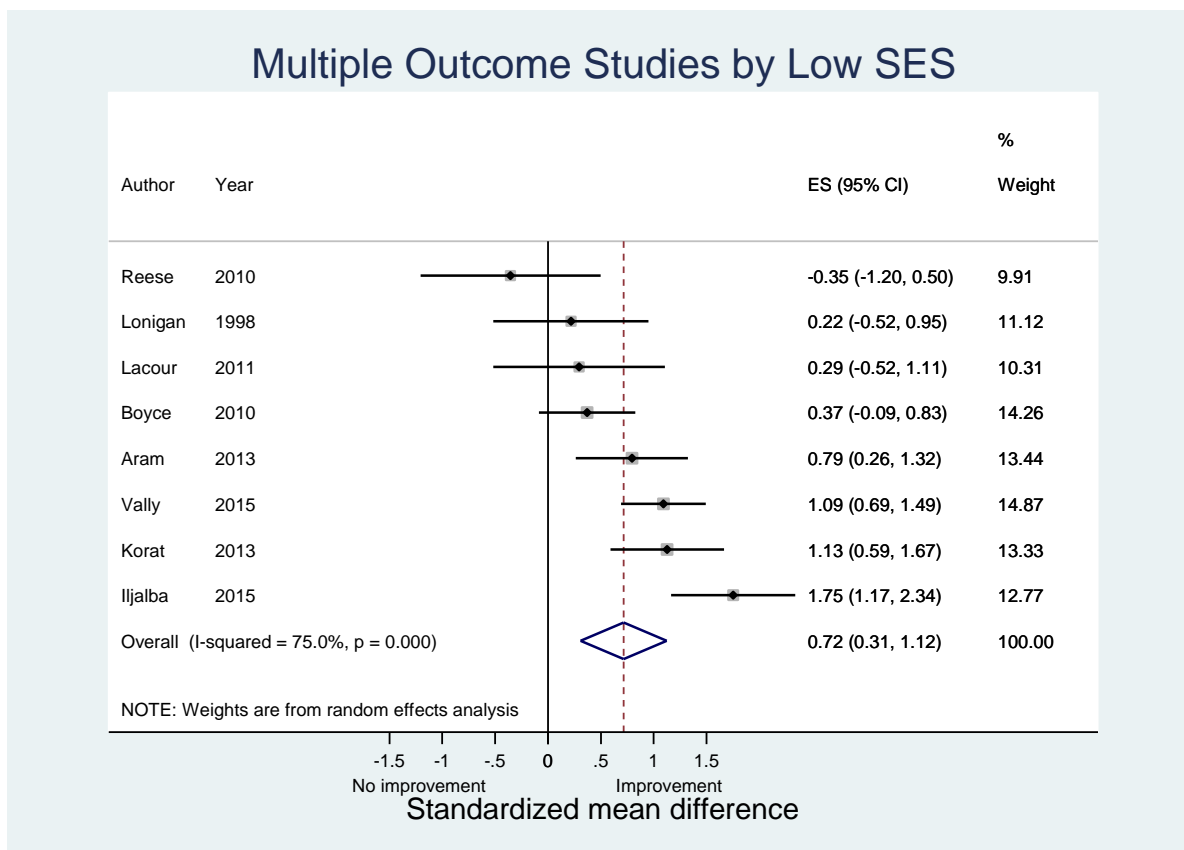
Figure 19. Subgroup analysis re-reading by type of parent training.



Subgroup analysis: All studies reporting Low SES and multiple outcome

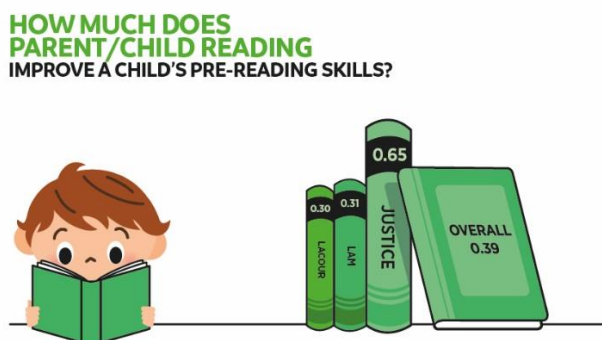
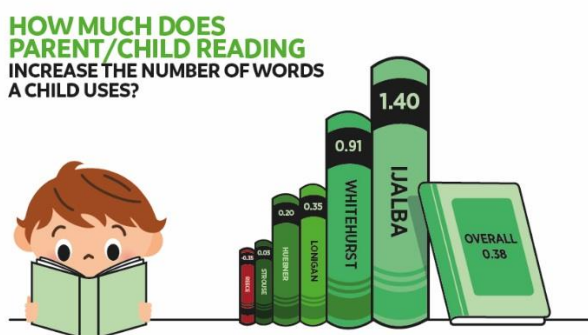
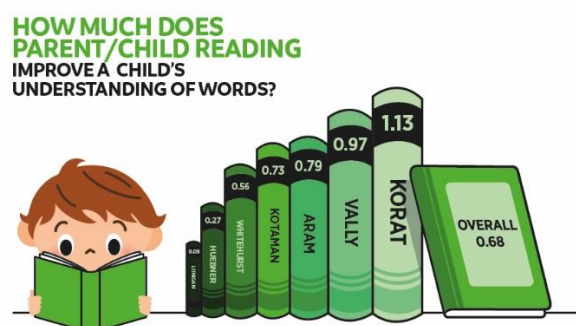
Finally, a subgroup analysis for Low SES was conducted for studies reporting multiple outcomes. The low SES studies forest plot, Figure 20, suggests that the associated interventions were overall statistically significant, being more effective than control in improving the children's scores. Therefore, children from Low SES benefit as much as others from language interventions across multiple outcomes. Despite this finding (SMD=0.37), the estimated predictive interval crossed the line of no effect (95% CI -0.30, 1.05) implying that in a future study the intervention group might appear to be no more effective than the control ($z=1.08$, $p < .00$). As in the reporting of the receptive vocabulary outcome above it is important to note that the studies with the higher effect have tended to be the more recent studies. Two studies did not overlap (Vally and Reese) and the study-specific estimates confirmed heterogeneity (Chi-squared=12.11 (df=3) $p=.00$). The amount of heterogeneity was 75.2%. The larger Vally study did show a more favourable result for the interventions, whereas the other smaller studies included the null effect.

Figure 20. Subgroup analysis for Low SES for multiple outcome studies.



Accessible infographics

We asked the question “Is it feasible to capture the key review findings in an accessible “user friendly” format.” As part of the work with our reference group we sought to make the key findings more accessible using infographics. To do this we engaged the help of graphic designer Rebecca Newman with a brief to make the data more easily understood without losing the key messages. The results can be seen in the graphics below. Effect size interpretation recommended by the Education Endowment Foundation may be found in Table 2 of this report. Using EEF guidance, an effect size between -0.01-0.18 is Low, 0.19-0.44 Moderate, 0.45-0.69 is High, and 0.70->1.0 Very High.



To date, this is an exploratory process, but responses have been positive, and we propose to make more use of them as a part of the dissemination process.

Summary

In this chapter we have reported the primary meta-analyses and subgroup analyses for each of our three key outcomes (oral language including expressive language and vocabulary and receptive language and vocabulary, and pre-school outcomes including pre-reading outcomes). On balance the results indicated moderate to high effect sizes using the Coe criteria outlined above in Table 2 (Coe et al., 2013). They were certainly more conservative than many of the results of the meta-analyses reported in the introduction to this report. Whilst the data for expressive and receptive vocabulary and pre-reading is clear and especially convincing where the homogeneity of the results is high, there was not a great range of alternative outcomes identified in the book reading interventions (unlike the broader interventions such as those identified in the EIF's Foundations for Life). Similarly, most of the studies included in the review were relatively short in duration and did not include follow up phases. So, it is difficult to make a judgement about the longer terms implications of such interventions. It may be that the effects wash-out, but it is also possible that such interventions may contribute to the "upward spiral of causality" described by Mol and Bus in their 2011 review. For example, early parent child reading affects early language development and children who are more proficient in language comprehension/expression and literacy skills read more; because of more print exposure, their comprehension and technical reading and spelling skills improve more with each year of education. Our results suggest that parent child book reading interventions, at least in the first instance, may be as much about attention, communication, and language development as they are about learning to read and write.

Our subgroup analyses include fewer studies, but it is clear that there are differences, albeit relatively modest, favouring older children and children from more socially disadvantaged groups. Our finding that shared reading has a greater effect than dialogic reading at least for receptive language is important because it challenges the prevailing orthodoxy that dialogic reading is necessarily more effective than other forms of parent/child reading. These interventions appear to have fairly immediate effects and there does not appear to be a

distinct advantage of extending intervention by duration or frequency of sessions. And, finally, the fact that RCTS and quasi-experimental studies obtain similar results supports the inclusion of both types of study in the present review; both quasi-experimental studies and RCTs are providing robust and reliable outcomes.

Chapter 5 – DISCUSSION

The review aimed to address five research questions as follows, and each will be addressed in turn:

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1. What is the evidence of effectiveness of joint book reading with preschool children and parents in improving school readiness, oral language, and parent child interactions?
2. How does effectiveness vary between characteristics of children, for different adult relationships to the child and with different reading intervention activities?
3. Is it feasible to capture the key review findings in an accessible “user friendly” format?
4. To what extent does this evidence translate into sustained improvements in language and literacy outcomes for children?
5. What should be recommended to early years’ practitioners, commissioners and policy makers about the messages associated with early parent-child reading?

Seven recommendations are then made for different potential consumers of the review following by a series of conclusions.

What is the evidence of effectiveness of joint book reading with preschool children and parents in improving school readiness, oral language, and parent child interactions?

The review found some evidence to support the effectiveness of parent-child reading interventions, in both children <3 years older and those >3 years old. The studies suffered from moderate risk of bias and were heterogeneous in the nature and delivery of the intervention. However, the results of the meta-analyses suggested that the findings were consistent albeit rather more conservative, than those in previous reviews. Compared to controls, children who received parent-child reading interventions significantly increased their expressive vocabulary with medium (0.38) effect sizes, slightly favouring the younger children. The effect size of 0.59 for expressive vocabulary reported in Mol, Bus and deJong et al. (2008), is rather higher than our figure but again there was a tendency for younger

children (in their case pre-schoolers (3-5 years) rather than kindergarten children (5-6 years). The positive impact on expressive vocabulary indicated in the current review is also reflected in the number of different or unique words learnt as a result of intervention, with a trend towards children in intervention groups learning more words than control group children, with a medium effect size of 0.53. This supports findings of Wasik, Hindman and Snell (2016) who reported modest effect sizes for word learning as a result of book reading practices in early childhood. However, it is important to note that out of only three studies reporting on number of words learnt, two showed evidence of heterogeneity with wider confidence intervals overlapping negative and positive effects, therefore children's response to intervention was variable across studies, and there was a non-significant difference between intervention and control groups, i.e., a trend in data only. In addition, the pooled estimates for expressive outcomes are largely influenced and inflated by the Ijalba study which had a large effect size of 1.40. This large effect size may be due to the bilingualism of the children in the study; authors suggest greater vocabulary scores may be influenced by the interconnectedness of language systems in bilingual children.

For receptive vocabulary, children who received parent-child reading intervention were found to increase their receptive vocabulary compared to control group children, with a large effect size of 0.68. This effect size is substantially greater than that reported in Mol, Bus and deJong et al (2008) who explicitly looked at vocabulary outcomes and reported an effect size of 0.22 for receptive vocabulary. Clearly overall effects are likely to be sensitive to studies included in a given review and the four studies with the highest effect sizes for receptive vocabulary for example were published after the Mol, Bus and deJong (2008) review was completed. It is also important to point out that confidence intervals for three of the studies reporting receptive vocabulary outcomes in the present review suggest greater variability between children in how they respond to the intervention, although within study confidence intervals are also sensitive to sample size.

How does effectiveness vary between characteristics of children, for different adult relationships to the child and with different reading intervention activities?

Subgroup analyses

Age, SES, frequency of interventions, and type of parent training were analysed for expressive and receptive outcomes. Type of intervention was analysed for receptive and pre-reading outcomes. Frequency and type of parent training were analysed for all three outcomes. The subgroup for type of study (RCT/Quasi) was analysed for expressive outcomes only because there were no quasi studies reporting receptive outcomes.

Age

Age subgroup analysis was conducted for both expressive and receptive outcomes. Based on limited evidence, for expressive outcomes no difference was found within the age groups of 2 years or 3-4 years in the improvement of those language scores. However, for receptive outcomes based on the PPVT there was a significant large overall effect size for age in the subgroup analysis (0.68), with the largest effect sizes observed for children aged > 3 years old. This suggests that intervention may have the greatest impact on children's receptive vocabulary when children are >3 years old.

SES

The subgroup analysis for SES in studies reporting expressive language outcomes revealed a non-significant and very small standard mean difference, therefore suggesting children from low SES backgrounds respond similarly to other children in terms of expressive language outcomes compared to all children (regardless of SES), i.e. low SES children do as well as other children in their response to intervention; there was no difference in analysis outcomes for expressive language when all children were analysed together, or low SES were analysed separately. However, there was limited evidence to explore this. This finding does not support findings by Marulis (2010) that did find a difference between SES, (that middle and upper SES at-risk children were more likely to benefit from intervention than more socially disadvantaged), although it is important to add that both groups benefitted from the interventions identified. As was observed in the age subgrouping, the opposite was found for receptive outcomes; there was a significant and large effect size for the low SES group. This suggests greater impact of intervention on receptive language in children from low SES backgrounds. This supports the original Bus (1995) study that reported children from low-SES benefit more from this type intervention than higher-SES children. It may be that this is more to do with developing attention and listening skills which then feed into

receptive language skills and that these may be less well developed in more disadvantaged children and thus be more likely to respond to intervention. These differences may be less pronounced when it comes to expressive language skills, at least in the study arms included in this review. As we have said above given the number of studies in some of these subgroup analyses care has to be taken not to over-extrapolate from the results of a relatively small number of studies.

Frequency

In our analyses we attempted to capture the “amount” of intervention using a single construct which we called *frequency*. And, in each case, it appears that there does not appear to be a frequency response relationship. In other words, it is not simply a matter of the more you do the greater the effect. Yet these findings have to be treated with some caution because there are a number of ways of capturing this dimension. For example, it would be possible, following Warren, Fey and Yoder (2007) and Zeng, Law & Lindsay (2012) and to consider the amount of intervention in terms of dose, dose frequency, total intervention duration and cumulative intervention intensity but such detail is rarely provided in the intervention studies concerned.

Characteristics of Intervention

For receptive studies, shared reading interventions appeared to produce a larger effect on children’s PPVT scores than dialogic reading interventions and interventions most effective were those lasting from 0-10 weeks. This period of intervention time is common in clinical practice therefore supports the continued use of this duration for interventions targeting receptive language. For pre-reading studies, those interventions were more effective than control for both dialogic and shared strategies, with dialogic yielding larger effect sizes than shared interventions. Again, the most commonly used durations 0-10 weeks were effective for pre-reading outcomes. Group parental training of reading approaches were effective for expressive, receptive and pre-reading outcomes. Group training is both time and cost-effective therefore current outcome support the continued use of training parents together. In addition, this approach allows parents to engage with, learn from and support each other throughout the intervention.

The subgroup analysis looking at RCT studies reporting expressive outcomes based on the EOWPVT revealed a medium and significant effect size (0.47), a larger value than that reported in the analysis including both RCT and quasi-experimental studies (0.38). This sensitivity analysis demonstrates that the current result for expressive language based on the EOWPVT is robust, as the quasi-experimental study has little impact on the result. Whereas, we may have expected the quasi-experimental study to report a more positive result due to confounding variables, for example, because investigators were not blinded, in which case the pooled result for all study designs would have been very different to that of RCTs only.

Is it feasible to capture the key review findings in an accessible “user friendly” format?

Our infographics suggests that it is certainly feasible to generate such images. Whether it is advantageous to do so remains to be seen and we plan to follow-up on how these are received. In part it probably depends on the background of the observer. We anticipate that practitioners may find the infographics easier to interpret.

To what extent does this evidence translate into sustained improvements in language and literacy outcomes for children?

We did not find evidence supporting the long-term outcomes for the children in these studies. This is not to say that there were negative findings, simply that the studies (like many associated with child development, are relatively small and almost always short in duration (reflecting funding exigencies). Likewise, as the majority of studies are RCTs, these are the most robust research design, but are not usually long-term studies due to cost. There is clearly a case for examining this further.

What should be recommended to early years' practitioners, commissioners and policy makers about the messages associated with early parent-child reading?

We make a series of specific recommendations below following on from the analyses carried out in this report.

Recommendation 1: FOR CARERS

That knowledge about the role of parents as partners in active book reading be widely disseminated through all relevant early years organisations.

Active book reading, and parental engagement with other electronic devices with young children helps to promote their language development and improves children's chances of being ready for school.

Recommendation 2: FOR PRACTITIONERS

That all early years/ public health practitioner are aware that parent/child book reading activities need to be a part of the early years "offer" to parents and young children.

This is relevant at a targeted selected and a targeted indicated level (ie with children in "at risk" populations and with children individually identified as having delayed language development). It is important that these interventions could potentially be delivered by a number of different professional groups but should involve the type of support and instruction seen in the intervention studies described in this review.

Recommendation 3: FOR THOSE MANAGING SERVICES FOR YOUNG CHILDREN

That services are audited to establish where such interventions are being delivered.

While the benefits of early reading are widely recognised it is not clear where the responsibility for this type of intervention lies or indeed whether systematic interventions of this type are being delivered in the UK.

Recommendation 4: FOR COMMISSIONERS OF SERVICES

That parent/child book reading should be an explicit element in the offer to young children and their families.

Ultimately whether parent/child book reading interventions are available will depend on whether they are commissioned although it is recognised that they may already be part of the local “offer” to parents. Our evidence suggests that commissioners should ensure that such interventions are available for all children, irrespective of how they are delivered locally.

The focus in the present review has been on parent-child book reading primarily in the home within the preschool period and the findings are relevant to a variety of different commissioners. On the one hand the messages are clearly for health visitors because they are the professional group with the most direct and the earliest contact with families and are best able to judge where there is a need for this type of intervention. On the other hand, within the UK context services are commissioned across health and education by Clinical Commissioning Groups in England or by local authorities and health services in the devolved countries (Scotland, Wales and Northern Ireland). This potentially involves a wide range of different services and the messages are also relevant for charitable organisations working “on the ground” with families. Similarly, there is a key role for early years providers, not just in providing plenty of book reading opportunities within the early years setting (nurseries playgroups), but also in actively engaging parents in the process. It is not just a matter of providing services, libraries, book buses etc, which are often best used by the most motivated parents, who arguably may need access to services least, but about active engagement with parents and showing them how to best take advantage of these opportunities. Although book gifting programmes have been widely used in Sure Start programmes and the like, we found no specific evidence to support them. Rather the evidence found suggested that those interventions with parent training/interaction were likely to be more effective.

Recommendation 5: FOR THE COMMISSIONERS OF RESEARCH

That there is a need for trials to be carried out within the current UK context and the new initiatives from the Nuffield Foundation and the Education Endowment Foundation provide an excellent opportunity to undertake such an evaluation. These would also allow for these interventions to be evaluated in the diverse UK population, which to date is a gap in the evidence base.

As indicated above, one of the strongest findings of this review is that book reading interventions meeting our inclusion criteria have not been carried out in the UK. Even in our excluded studies only one was from the UK and was excluded because it was a student thesis. The majority (17) of the studies were located in the USA, 2 were in South Africa, 2 were in Canada, 1 in New Zealand, 1 in Israel, and 1 was in Hong Kong. There is therefore, a stark gap for UK-based studies into the impact of parent-child reading on children's language and school-readiness. Given the universality of the health visitor offer in the UK, and the central role of health visitors in reaching out to the parents of young children through developmental checks etc. this is perhaps surprising and points to the opportunity to engage health visitors in the implementation of parent-child reading practices and research.

Recommendation 6: FOR RESEARCHERS

That there be a better understanding of the differential effects of book reading on different populations and of the mechanisms by which book reading is associated with other aspects of the child's Home Learning Environment such as socio-economic status and maternal education; what are the differential relationships between these factors and parent-child book reading and child outcomes.

Although it was possible to compare the results of studies that compared more disadvantaged populations with mixed populations suggesting that the effects were comparable, but this needs to be tested experimentally to establish whether parent/child book reading interventions have the potential to accelerate the skills of more disadvantaged children and thus reduce the well-recognised gap in school readiness between more and less disadvantaged pupils.

Recommendation 7: FOR POLICY MAKERS

That parent/child book reading, and its equivalents be a part of the offer to all children and their families and that this be woven into local responses to the Governments Social Mobility Strategy (<https://www.gov.uk/government/policies/social-mobility>)

It may be necessary to have targeted indicated interventions for children with the lowest language skills (irrespective of SES) in tandem with targeted selected approaches focussing on more disadvantaged children. Implications for research at one level are the same as

those made by Marmot in 2010. Books in the home are likely to be a mediator of the effects of social disadvantage on school readiness and book reading interventions do have the potential to disrupt the negative consequences of disadvantage on school readiness. Yet the fact remains that parental book reading interventions are not universally offered in a formal sense in the public health offer in England. There is some evidence that for example with Book Bus there are such initiatives in Scotland, but their uptake is certainly not universal or indeed targeted to those who need it most. This suggests that some of the emphasis in public health policy has been misplaced or at the least over optimistic. Our argument is that parent/child reading is a critical first step in the range of activities that enhance school readiness and feed into the English Government's Social Mobility Strategy and the equivalent initiatives in the UK's devolved countries.

Overall conclusions of the review

The present review represents a step forward in terms of the rigour of the review process, identifying studies meeting strict inclusion criteria, grouping them by outcome (all language related) in a coherent manner and meta-analysing them where appropriate. We identify eight key conclusions from the review.

CONCLUSION 1: Interventions to promote language development and pre-reading are effective. The strongest impact is on children's receptive vocabulary development.

CONCLUSION 2: Although the results of interventions vary for children of different ages, book reading appeared to be most effective for children over three years old particularly in the development of receptive vocabulary.

CONCLUSION 3: Children from disadvantaged backgrounds and those from mixed backgrounds benefitted equally from book reading interventions in their expressive language development.

CONCLUSION 4: Children from disadvantaged backgrounds benefitted more from book reading interventions than children from mixed backgrounds in terms of the impact intervention had on their receptive language development.

CONCLUSION 5: The amount of intervention a child was exposed to did not influence how much the child's language improved; relatively little input can have just as high an impact as more intensive intervention.

CONCLUSION 6: Book reading interventions that involved training parents in a group had greater effects on children's language development than interventions where parents were trained individually.

CONCLUSION 7: Both studies that used a randomised design (*where children are either randomly allocated to receive the intervention or to not receive the intervention, a control group*) and those that used a quasi-experimental design (*where the intervention group and control group are matched on characteristics*) showed equally positive results for children's language development.

CONCLUSION 8: There is a great deal more that needs to be learned about the long-term consequence of early parent/child reading interventions in terms of their impact on educational attainment and longer-term outcomes.

GENERAL REFERENCES

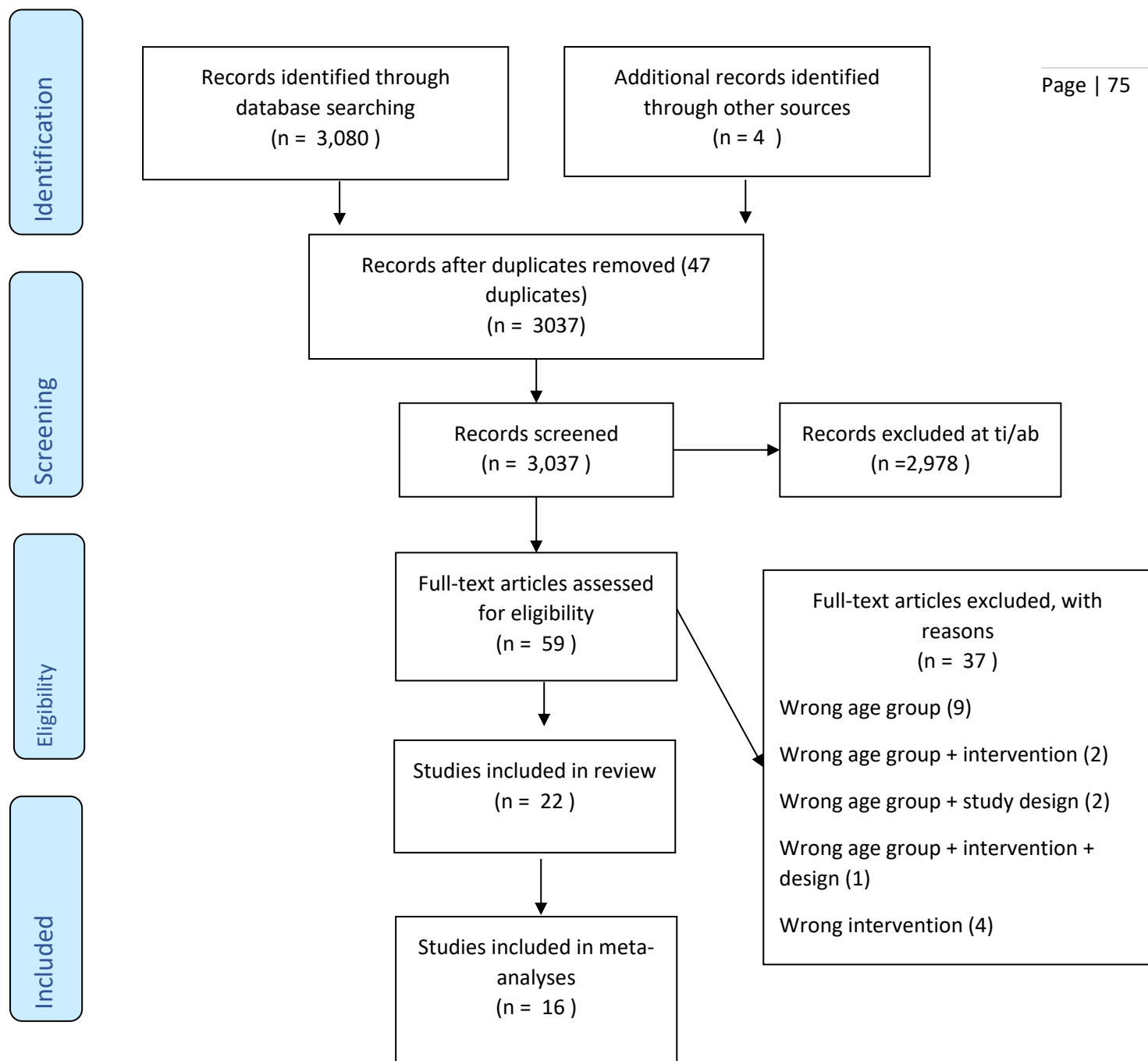
- Asmussen, K., Feinstein, L., Martin, J., and Chowdry, H. (2016) *Foundations for Life: What Works to Support Parent Child Interaction in the Early Years*, Early Intervention Foundation. <http://www.eif.org.uk/publication/foundations-for-life-what-works-to-support-parent-child-interaction-in-the-early-years/>
- Bradbury, B., Corak, M., Washbrook, E., and Waldfogel, J. (2015). Too many children left behind: the U.S. achievement gap in comparative perspective. New York: Russell Sage.
- Bookstart. (2017). *Current Bookstart International Affiliates*. [Online]. Available from <http://www.bookstart.org.uk/about/international/current-affiliates/> Accessed July 17 2017.
- Bus, A. G., van Ijzendoorn, M. H., and Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: meta-analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65, 1-21.
- Campbell Collaboration Writing a Systematic Review (2018). Available from <https://www.campbellcollaboration.org/research-resources/writing-a-campbell-systematic-review.html> Accessed May 31 2018
- Close, R. (2001). *Parental Involvement and Literacy achievement. The research evidence and the way forward*. National Literacy Trust. [Online]. Available from http://www.literacytrust.org.uk/assets/0000/0423/Parental_involvement_2001.pdf Accessed July 17th 2017.
- Coe, R, Kime, S. Neville, C. and Coleman, R. (2013) *The DIY evaluation guide* London: Education Endowment Foundation.
- Cohen, J. (1969). Statistical power for the behavioural sciences. London: Academic Press
- De Graaf, N.D., De Graaf P.M. and Kraaykamp, G. (2000) Parental Cultural Capital and Educational Attainment in the Netherlands: A Refinement of the Cultural Capital Perspective *Sociology of Education* 73, 92-111 DOI: 10.2307/2673239.
- Dickinson, D. K., Griffith, J. A., Golinkoff, R. M., and Hirsh-Pasek, K. (2012). How Reading Books Fosters Language Development around the World, *Child Development Research*, Article ID 602807, doi:10.1155/2012/602807.
- Field, F. (2010). *The Foundation Years: preventing poor children becoming poor adults - The report of the Independent Review on Poverty and Life Chances*. London:HM Government
- Glass, G. V., McGraw, B., Smith, M. L. (1981). *Meta-analysis in social research*. London: SAGE
- Gorard, S., and Huat See, B. (2013). *Do parental involvement interventions increase attainment. A review of the evidence*. Nuffield Foundation. [Online]. Available from http://www.nuffieldfoundation.org/sites/default/files/files/Do_parental_involvement_interventions_increase_attainment1.pdf
- Harbord, R. M., and J. P. T. Higgins. 2008. Meta-regression in Stata. *Stata Journal*.
- Higgins, J. P. T., and S. G. Thompson. 2001. *Presenting random effects meta-analyses: where are we going wrong? In 9th International Cochrane Colloquium*. Lyon, France.
- Higgins JPT, Green S (editors). (2011). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, Available from <http://handbook.cochrane.org>. Accessed: March 2018.
- Hirsh-Pasek, K., Adamson, L.B., Bakeman, R., Owen, M.T., Golinkoff, R. M., Pace, A., Yust, P. K.S., Suma, K. (2015) The Contribution of Early Communication Quality to Low-Income Children's Language Success *Psychological Science* 26, 1071 - 1083
<https://doi.org/10.1177/0956797615581493>

- Jerrim, J. (2013). *The Reading Gap: The socio-economic gap in children's reading skills: A cross national comparison using PISA 2009*. London: Sutton Trust.
- Law, J., Rush, R. Roulstone, S., Clegg, J. and Peters, T. (under review) The association of distal and proximal elements of social disadvantage with children's language development at 2 years: an analysis of data from the Children in Focus (CiF) sample from the ALSPAC birth cohort *International Journal of Language and Communication Disorders*
- Law, J. Charlton, J. and Asmussen, K. (2017) *Child language as a wellbeing indicator*. London: Early Intervention Foundation
- Law, J. Charlton, J., Dockrell, J., Gascoigne, M., McKean, C. and Theakston, A. (2017) *Early Language Development: Needs, provision and intervention for preschool children from socio-economically disadvantage backgrounds*. London: Education Endowment Foundation
- Law, J., Rush, R. King, T., Westrupp, L., Reilly, S. (2017) The association between early home activities and oral language skills in middle childhood: A quantile analysis *Child Development* <http://onlinelibrary.wiley.com/doi/10.1111/cdev.12727/epd>
- Law, J., King, T., and Rush, R. (2014). *Newcastle University evidence paper for the Read On, Get On coalition: An analysis of early years and primary school age language and literacy data from the Millennium Cohort Study*. London: Save the Children.
- Law, J., Rush, R., Parsons, S., and Schoon, I. (2009). Modelling developmental language difficulties from school entry into adulthood: Literacy, mental health and employment outcomes. *Journal of Speech, Language and Hearing Research*, 52, 1401-1416.
- Marulis, L. M., and Neuman, S. B. (2010). The Effects of Vocabulary Intervention on Young Children's Word Learning: A Meta-Analysis. *Review of Educational Research*, 80 (3), 300–335.
- Mangen, A., Walgermo, B. R., and Bronnack, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension, *International Journal of Educational Research*, Vol. 58, 61–68.
- McKean, C., Mensah, F., Eadie, P., Bavin, E., Bretherton, L., Cini, E. et al. (2015). Levers for language growth: characteristics and predictors of language trajectories between 4 and 7 years. *PLoS one*, 10(8), e0134251.
- Mol, S. E., Bus, A. G., de Jong, M. T., and Smeets, D. J. H. (2008). Added Value of Dialogic Parent–Child Book Readings: A Meta-Analysis, *Early Education and Development*, 19:1, 7-26.
- Mol, S. E., Bus, A. G., and deJong, M. T. (2009). Interactive Book Reading in Early Education: A Tool to Stimulate Print Knowledge as well as Oral Language. *Review of Educational Research*, 79(2), 979-1007
- Mol, S.E., and Bus, A.G. (2011). To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin*, 137 (2) 267-296.
- NELP (National Early Literacy Panel). 2008. Developing Early Literacy: Report of the National Early Literacy Panel. Washington, DC: National Institute for Literacy. <http://lincs.ed.gov/publications/pdf/NELPReport09.pdf>.
- Puglisi, M. L., Hulme, C., Hamilton, L.G. and Snowling, M.J. (2017): The Home Literacy Environment Is a Correlate, but Perhaps Not a Cause, of Variations in Children's Language and Literacy Development, *Scientific Studies of Reading*, DOI: 10.1080/10888438.2017.1346660
- Ramey, C.T. and Ramey, S.L. (2004) Early Learning and School Readiness:

- Can Early Intervention Make a Difference? *Merrill-Palmer Quarterly*, October 2004, 50, 471–491. DOI: 10.1353/mpq.2004.0034
- Reach Out and Read. (2014). [Online]. Available from <http://www.reachoutandread.org/> Accessed July 17, 2017.
- Save the Children. (2015). *Ready to read: Closing the gap in early language skills so that every child in England can read well*. London: Save the Children.
- Shonkoff, J., and Phillips, D. (eds.) (2000). *From neurons to neighborhoods: the science of early child development*. Washington, DC: National Academies Press.
- Sloat, E. A., Letourneau, N. L., Joschko, J. R., Schryer, E. A., and Colpitts, J. E. (2015). Parent-Mediated Reading Interventions with Children Up To Four Years Old: A Systematic Review, *Issues in Comprehensive Pediatric Nursing*, 38:1, 39-56.
- Social Mobility and Child Poverty Commission. (2015). *State of the Nation 2015: social mobility and child poverty in Great Britain*. London: The Stationery Office.
- U.S. Department of Education, Institute of Education Sciences. (2015). Early childhood education intervention report: Shared book reading retrieved from What Works Clearing House: <http://whatworks.ed.gov> Date retrieved 20.01.16.
- Taylor, C. L., Zubrick, S.R. and Christensen, D. (2016). Barriers to Parent–Child Book Reading in Early Childhood *International Journal of Early Childhood* 48, 295–309 DOI 10.1007/s13158-016-0172-2.
- van Bergen, E., Bishop, D., van Zuijen, T. and Peter F. de Jong, P. F. (2015). How Does Parental Reading Influence Children’s Reading? A Study of Cognitive Mediation *Scientific Studies of Reading*, 19:5, 325-339, DOI: 10.1080/10888438.2015.1050103
- Wade, B., and Moore, M. (2000). A sure start with books. *Early Years*, 20, 39-46.
- Warren, S.F., Fey, M. & Yoder, P.J. (2007) Differential treatment intensity research: A missing link to creating optimally effective communication interventions. *Mental retardation and Developmental disabilities research Reviews* 13, 70-77.
- Wasik, B. A., Hindmann, A. H., Snell, A. K. (2016). Book reading and vocabulary development: A systematic review. *Early Childhood Research Quarterly*, 37, 39–57
- Wastlund, E., Norlander, T., and Archer, T. (2008). The effect of page layout on mental workload: A dual-task experiment, *Computers in Human Behavior*, Vol. 24, No. 3, 1229–1245.
- What Works Clearing House. (2015). [online] Available from <http://ies.ed.gov/ncee/wwc/> Accessed December 16 2016.
- Zeng, B., Law, J. & Lindsay, G. (2012) Characterising optimal intervention intensity: The relationship between dosage and effect size in interventions for children with developmental speech and language difficulties *International Journal of Speech-Language Pathology* 14, 5, 471-477.

APPENDICES

Appendix A: PRISMA diagram of study inclusion and exclusion



Appendix B: Sample search strategy

1. Preschool children
2. Pre-school children
3. Toddler*
4. Kindergarten children
5. Nursery children
6. 1 OR 2 OR 3 OR 4 OR 5
7. Parent child relationship
8. Parent participation
9. Parents as teachers
10. Reading
11. Preschool Education
12. Early reading
13. Beginning reading
14. Emergent literacy
15. Prereading experience
16. Reading readiness
17. Parent-child reading
18. Parent reading
19. Books
20. Storytelling
21. Book-gifting
22. Shared book reading
23. Dialogic reading
24. Tablets
25. Kindle
26. Print exposure
27. Reach out and Read
28. Book Start
29. 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21
OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28
30. 6 AND 29

Appendix C: References of included studies

Aram, D., Fine, Y., and Ziv, M. (2013). Enhancing parent-child shared book reading interventions: Promoting references to the book's plot and socio-cognitive themes. *Early Childhood Research Quarterly*, 28, 111-122.

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Arnold, D. H., Lonigan, C. J., Whitehurst, G. J., and Epstein, J. N. (1994). Accelerating Language Development Through Picture Book Reading: Replication and Extension to a Videotape Training Format. *Journal of Educational Psychology*, 86(2), 235-243.

Blom-Hoffman, J., O'Neil-Pirozzi, T., Volpe, R., Cutting, J., and Blissinger, E. (2007). Instructing Parents to Use Dialogic Reading Strategies with Preschool Children: Impact of a Video-Based Training Program on Caregiver Reading Behaviors and Children's Related Verbalizations. *Journal of Applied School Psychology*, 23(1), 117-131.

Boyce, L. K., Innocenti, M. S., Roggman, L. A., Jump Norman, V. K., and Ortiz, E. (2010). Telling Stories and Making Books: Evidence for an Intervention to Help Parents in Migrant Head Start Families Support Their Children's Language and Literacy. *Early Education and Development*, 21(3), 343-371.

Cooper, P. J., Vally, Z., Cooper, H., Radford, T., Sharples, A., Tomlinson, M., and Murray, L. (2014). Promoting mother-infant book sharing and infant attention and language development in an impoverished South African population: A pilot study. *Early Childhood Education Journal*, 42, 143-152.

Cronan, T. A., Cruz, S. G., and Arriaga, R. I. (1996). The effect of a community-based literacy program on young children's language and conceptual development. *American Journal of Community Psychology*, 24 (2), 251-272.

Heubner, C. E. (2000). Promoting toddlers' language development through community-based intervention. *Journal of Applied Developmental Psychology*, 21 (5), 513-535.

Ijalba, E. (2015). Effectiveness of a parent-implemented language and literacy intervention in home language. *Child Language Teaching and Therapy*, 31 (2), 207-220.

Irwin, O. C. (1960). Infant Speech: Effect of Systematic Reading of Stories. *Journal of Speech, Language, and Hearing Research*, 3(2). 187-190.

Justice, L. M., Ezell, H. K. (2000). Enhancing Children's Print and Word Awareness Through Home-Based Parent Intervention. *American Journal of Speech-Language Pathology*, 9, 257-269.

Korat, O., Shamir, A., and Heibel, S. (2013). Expanding the boundaries of shared book reading: E books and printed books in parent-child reading as support for children's language. *First Language*, 33(5), 504-523.

Kotaman, H. (2013). Impacts of dialogical storybook reading on young children's attitudes and vocabulary development. *Reading Improvement*, 50(4), 55-63.

LaCour, M. M., McDonald, C., Tissington, L., and Thomason, G. (2011). The impact of a caregiver workshop regarding storybook reading on pre-kindergarten children's emergent literacy development. *Education*, 132(1), 64-81.

Lam, S., Chow-Yeung, K., Wong, B. P. H., Lau, K. K., and Tse, S. I. (2013). Involving parents in paired reading with preschoolers: results from a randomized controlled trial. *Contemporary Educational Psychology*, 38, 126-135.

Lonigan, C. J., and Whitehurst, G. J. (1998). Relative efficacy of parent and teacher involvement in a shared-reading intervention for preschool children from low-income backgrounds. *Early Childhood Research Quarterly*, 13(2), 263-290.

Pile, E., Girolametto, L., Johnson, C. J., Chen, X., and Cleave, P. L. (2010). Shared Book Reading Intervention for Children with Language Impairment: Using Parents-as-aides in Language Intervention. *Canadian Journal of Speech-Language Pathology and Audiology*, 34(2), 96-109.

Reese, E., Leyva, D., Sparks, A., and Grolnik, W. (2010). Maternal Elaborative Reminiscing Increases Low-Income Children's Narrative Skills Relative to Dialogic Reading. *Early Education and Development*, 21(3), 318-342.

Sook Lim, Y., and Cole, K. N. (2002). Facilitating first language development in young Korean children through parent training in picture book interactions. *Bilingual Research Journal*, 26(2), 367-381.

Strouse, G. A., O'Doherty, K., and Troseth, G. L. (2013). Effective coviewing: preschoolers' learning from video after a dialogic questioning intervention. *Developmental Psychology*, 49(12), 2368-2382.

Tsybina, I., and Eriks-Brophy, A. (2010). Bilingual Dialogic Book-Reading Intervention for Preschool Children with Slow Expressive Vocabulary Development: A Feasibility Study. *Journal of Communication Disorders*, 43 (6), 538-556.

Vally, Z. (2015). The impact of dialogic book-sharing training on infant language and attention: a randomized controlled trial in a deprived South African community. *Journal of Child Psychology and Psychiatry*, 56 (8), 865-873.

Whitehurst, G. J., Falco, F. L., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. D., Valdez-Menchaca, M. C., and Caulfield, M. (1988). Accelerating Language Development Through Picture Book Reading. *Developmental Psychology*, 24 (4), 552-559.

Appendix D: List of excluded studies

Author	Year	Citation	Location	Reason for exclusion
Chow	2008	Chow BW-Y et al. Dialogic Reading and Morphology Training in Chinese Children: Effects on Language and Literacy. <i>Developmental Psychology</i> 2008;44:233-44.	Hong Kong	Mean age of children >60 mo (mean=63.8, SD=3.87, range=57-71 mo)
Collins	2010	Collins MF. ELL Preschoolers' English Vocabulary Acquisition from Storybook Reading. <i>Early Childhood Research Quarterly</i> 2010;25:84-97.	United States	Reading not with parent; mean age of children >60 mo (mean=54, range= 48-64 mo)
Justice	2010	Justice LM et al. Print-Focused Read-Alouds in Preschool Classrooms: Intervention Effectiveness and Moderators of Child Outcomes. <i>Lang Speech Hear Serv Sch</i> 2010;41:504-20.	United States	Reading not with parent; no control group
Mendelsohn	2001	Mendelsohn AL, Mogilner LN, Dreyer BP, et al. The impact of a clinic-based literacy intervention on language development in inner-city preschool children. <i>Pediatrics</i> 2001;107:130-4.	United States	No control group
Phaneuf	2011	Phaneuf L, McIntyre LL. The Application of a Three-Tier Model of Intervention to Parent Training. <i>Journal of Positive Behavior Interventions</i> 2011;13:198-207.	United States	Intervention is not book reading with children; outcomes are only parent-related
Zevenbergen	2003	Zevenbergen AA et al. Effects of a Shared-Reading Intervention on the Inclusion of Evaluative Devices in Narratives of Children from Low-Income Families. <i>Journal of Applied Developmental Psychology</i> 2003;24:1-15.	United States	Reading not exclusively with parent
Roberts	2013	Roberts KL. Comprehension Strategy Instruction during Parent-Child Shared Reading: An Intervention Study. <i>Literacy Research and Instruction</i> 2013;52:106-29.	United States	Mean age of children >5 yrs (intervention group 5.3 yrs, control group 4.11 yrs)

Levin	2012	Levin I, Aram D. Mother-Child Joint Writing and Storybook Reading and Their Effects on Kindergartners' Literacy: An Intervention Study. Reading and Writing: An Interdisciplinary Journal 2012;25:217-49.	Israel	Mean age of children >5 yrs (mean age=5.4, SD 0.35 yrs)
Niklas	2016a	Niklas F et al. Home Learning Environment and Concept Formation: A Family Intervention Study with Kindergarten Children. Early Childhood Education Journal 2016;44:419-27.	Australia	Not specifically a reading intervention
Niklas	2016b	Niklas F et al. Parents supporting learning: a non-intensive intervention supporting literacy and numeracy in the home learning environment. International Journal of Early Years Education 2016;24:121-42.	Australia	Not specifically a reading intervention
Sim	2014	Sim SSH et al. A Shared Reading Intervention with Parents to Enhance Young Children's Early Literacy Skills. Early Child Development and Care 2014;184:1531-49.	Australia	Mean age of children >5 yrs (mean age=5.53, SD=0.33yrs)
Korat	2013	Korat O et al. Book reading mediation, SES, home literacy environment, and children's literacy: Evidence from Arabic-speaking families. First Language 2013;33:132-54.	Israel	Mean age of children >60 mo (mean=68.74, SD=4.99 mo)
Korat (Study 1)	2016	Korat O, Segal-Drori O. E-Book and Printed Book Reading in Different Contexts as Emergent Literacy Facilitator. Early Education and Development 2016;27:532-50.	Israel	Reading not with parent
Korat (Study 2)	2016	Korat O, Segal-Drori O. E-Book and Printed Book Reading in Different Contexts as Emergent Literacy Facilitator. Early Education and Development 2016;27:532-50.	Israel	Mean age of children >60 mo (range=66.10-77.35mo)
Korat (Study 3)	2016	Korat O, Segal-Drori O. E-Book and Printed Book Reading in Different Contexts as Emergent Literacy Facilitator. Early Education and Development 2016;27:532-50.	Israel	Reading not with parent; mean age of children >60 mo (mean=69.65 SD=4.14 mo)

Fung	2005	Fung P-C et al. The Impact of a Dialogic Reading Program on Deaf and Hard-of-Hearing Kindergarten and Early Primary School-Aged Students in Hong Kong. <i>Journal of Deaf Studies and Deaf Education</i> 2005;10:82-95.	Hong Kong	Mean age of children >5 yrs (range=5.2-9.1 yrs)
Pratt	2015	Pratt AS, Justice LM, Perez A, et al. Impacts of Parent-Implemented Early-Literacy Intervention for Spanish-Speaking Children with Language Impairment. <i>International Journal of Language and Communication Disorders</i> 2015;50:569-79.	United States	Mean age of children >60 mo (range=42-84 mo)
Kraft	2001	Kraft BL, Findlay P, Major J, et al. The Association between a Home Reading Program and Young Children's Early Reading Skill. <i>Journal of Direct Instruction</i> 2001;1:117-36.	United States	Mean age of children >5 yrs (range=5-6 yrs)
Whitehurst	1994	Whitehurst GJ, et al. A Picture Book Reading Intervention in Day Care and Home for Children from Low-Income Families. <i>Developmental Psychology</i> 1994;30:679-89.	United States	Reading not exclusively with parent
Senechal	1998	Senechal M, LeFevre J-A, Thomas EM, et al. Differential Effects of Home Literacy Experiences on the Development of Oral and Written Language. <i>Reading Research Quarterly</i> 1998;33:96-116.	United States	Not a comparative study
McCormick	1984	McCormick CE, Mason JM, Illinois Univ UCftSoR, et al. Intervention Procedures for Increasing Preschool Children's Interest in and Knowledge about Reading. Technical Report No. 312. 1984.	United States	Mean age of children >60mo (mean ages 63.39-65.9 in the 4 different groups)
Brickman	2002	Brickman SO. Effects of a Joint Reading Strategy on Even Start; 2002	United States	Thesis
LaCour	2010	LaCour MM. The Impact of a Caregiver Workshop regarding Storybook Reading on Pre-Kindergarten Children's Readiness for Reading; 2010.	United States	Thesis; published version included
Fries	2004	Fries BJ. The Effects of Joint Book Reading Emphasizing Print Focus on Print Awareness in Preschool Children with Down Syndrome: A Preliminary Investigation; 2004.	United States	Thesis

Robb	2010	Robb MB. New Ways of Reading: The Impact of an Interactive Book on Young Children's Story Comprehension and Parent-Child Dialogic Reading Behaviors: ProQuest LLC; 2010.	United States	Thesis
Hasbun	2011	Hasbun TC. The effectiveness of shared reading interventions with families of Hispanic prekindergarten students; 2011.	United States	Thesis; mean age of children >5
Kotaman	2007	Kotaman H. Impacts of dialogical storybook reading on children's receptive vocabulary development and their parents' self-efficacy for storybook reading; 2007.	United States	Thesis
Halsey	2008	Halsey HN. Investigating a parent implemented early literacy intervention: Effects of dialogic reading using alphabet books on the alphabet skills, phonological awareness, and oral language of preschool children; 2008.	United States	Thesis
Simek	2014	Simek AN. Effects of a parent-delivered shared reading intervention on preschoolers' vocabulary acquisition; 2014.	United States	Thesis; not comparative study
Terry	2011	Terry M. Exploring the additive benefit of parental nurturance training on parent and child shared reading outcomes: A pilot intervention study; 2011.	United States	Thesis
Tsybina	2010	Tsybina I. Bilingual Dialogic Book-Reading Intervention for Preschool Children with Slow Expressive Vocabulary Development: A Feasibility Study; 2010.	United States	Thesis; published version included
Justice	2015	Justice LM, Logan JAR, Kaderavek JN, et al. Print-Focused Read-Alouds in Early Childhood Special Education Programs. <i>Exceptional Children</i> 2015;81:292-311.	United States	Reading not exclusively with parent
Anderson	2009	Anderson JA. Parent-delivered instruction of phonemic awareness and letter identification skills for four- and five-year-old children in South Dakota; 2009.	United States	Reading not exclusively with parent
Carroll	2013	Carroll C. The Effects of Parental Literacy Involvement and Child Reading Interest on the Development of Emergent Literacy Skills; 2013.	United States	No training for parents

Barker	1983	Barker WE, Barker WE. Reading and mathematics intervention programmes with parents of nursery children in disadvantaged areas: a psychological and methodological study; 1983.	UK	Thesis
Law	1993	Law M, Kratochwill TR. Paired reading: An evaluation of a parent tutorial program. School Psychology International 1993;14(2):119-147.	United States	Mean age of children >5
Morgan	2004	Morgan LJ, Goldstein H. Teaching mothers of low socioeconomic status to use decontextualized language during storybook reading. Journal of Early Intervention 2004;26:235-52.	United States	Not comparative study